

# **Data Communications Test Library**

## **HP 4957A Protocol Analyzer**



HP Part No. 04957-99001  
Microfiche Part No. 04957-98802  
Printed in U.S.A. July 1991

First Edition  
E0791

# Notice

Hewlett-Packard makes no warranty of any kind with regard to this material including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Hewlett-Packard assumes no responsibility for the use or reliability of its software on equipment that is not furnished by Hewlett-Packard.

This document contains proprietary information which is protected by copyright. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Hewlett-Packard Company. The information contained in this document is subject to change without notice.

If your software application or hardware should fail, contact your local Hewlett-Packard Sales Office listed in the protocol analyzer operating manual.

© Copyright 1991 Hewlett-Packard Company  
Colorado Telecommunications Division  
5070 Centennial Boulevard  
Colorado Springs, Colorado 80919-2497

### **Notice**

This application can be used with both the HP 4957A Protocol Analyzer and the HP 4952A Protocol Analyzer. The User's Guide refers to the HP 4952A in the operating procedures but operation is the same on the HP 4957A.



# Contents

---

<b>1. Product Introduction</b>	
Looking Up a Program.....	1-1
Using a Program.....	1-2
Program List .....	1-3
<b>2. Installing Programs</b>	
Loading a Program from Disc .....	2-1
Copying the Master Disc .....	2-2
Creating Your Customized Test Library.....	2-2
Printing a Program.....	2-3
<b>3. Program Descriptions</b>	

## Printing History

---

New editions are complete revisions of the manual. Update packages are issued between editions. They contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update. The edition does not change when an update is incorporated.

Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one-to-one correlation between product updates and manual updates.

Edition 1..... July 1989

### Problems? Call for Help

If you have problems operating your HP protocol analyzer or any of the applications, call the CTD Customer HelpLine or use your fax machine to send your questions.

**HelpLine - (719) 531-4567**

**Fax - (719) 531-4505**

## Product Introduction

---

This package of tests is intended to help you easily apply the power of Hewlett-Packard's protocol analyzers in the solution of common data communication problems. They also provide examples and starting points for you to develop custom tests. The Data Communications Test Library programs are written entirely in HP 4951C Monitor or Simulate menus. They work with the HP 4951C and HP 4952A in Asynchronous, Synchronous, SDLC/HDLC, X.25, and other environments.

This section presents a list of the programs with brief descriptions, grouped by application. A more detailed description of each program, with instructions for use and program results, is in the final section (Section 3) of this manual. It is highly recommended that a copy of the master disc be made. Instructions for copying the master disc, as well as loading, storing, modifying, and printing programs are in Section 2.

---

### Looking up a Program

All programs in this collection use the file name format defined below to aid in locating a desired program on a disc. The first letter of the file name indicates the program application listed in the following table.

- A General purpose asynchronous monitor programs
- B General purpose asynchronous simulate programs
- C Async terminal tests
- D Async printer tests
- E Test devices sending to async printers
- F Test async devices across a modem link
- I Interface tests (level 1)
- S SDLC tests
- U Instrument setups
- X X.25 tests

All tests are stored on disc with a comment field that briefly describes the test.

---

## Using a Program

If you are not yet familiar with your HP protocol analyzer, instructions for loading programs are presented in the next section. Hewlett-Packard recommends that you make a working copy of your master disc, also covered in Section 2, and then store the master disc in a safe place. Because all programs in the Data Communications Test Library are standard menus, they can be infinitely copied and easily modified for your particular needs. Note that any "Load Menus" or "Store Menus" operation involves Monitor, Simulate, Setup, and Run Menus.

## Data Communications Configuration (Protocol Analyzer Setup)

For consistency and simplicity, all programs in this library are stored with a common set of data communication parameters that are loaded into the analyzer when you load the program. These parameters may be easily changed in the Setup Menu to suit your system. Refer to the Operating Manual for your Hewlett-Packard protocol analyzer for guidance.

---

### Note

Changing some parameters, such as Code, Mode, or Character Framing, may require corresponding changes to the Monitor or Simulate menus. Programs modified to take advantage of unique HP 4952A program features may not run on the HP 4951C.

---

The parameters loaded with all library programs (except interface tests) are as follows:

9600 bps line speed  
ASCII-7, Odd parity for async  
EBCDIC, DCE supplies DTE clock for SDLC  
ASCII-8, DCE supplies DTE clock for X.25/HDLC

The parameters loaded for interface tests are as follows:

2400 bps line speed  
ASCII-8, no parity

## 1 - 2 Product Introduction



---

## Data Communications Test Library

### Program List

Program Name	Program Purpose
	<b>General purpose async monitor</b>
A_COUNTCHR	Count DTE and DCE characters for 1 min
A_COUNTPAR	Count DTE and DCE parity errors for 1 min
	<b>General purpose async simulate</b>
B_ASC7EVER	Send ASCII7 even parity errored string
B_ASC7ODER	Send ASCII7 odd parity errored string
B_AUTOBAUD	Find terminal's or printer's bit rate
B_BRBRPOLE	Send 81 char with Xon/off and DTR -continuous
B_BRBRPOLS	Send 81 char with Xon/off and DTR - 4 pages
B_FOXFLOW	Send QBFox with Xon/off and DTR - continuous
	<b>Async terminal tests</b>
C_ALGNMNT	Send "cross-hair in square" pattern for alignment
C_RESPTIME	Measure avg & instant response time CR - prompt
	<b>Async printer tests</b>
D_BUFFER	Determine printer's buffer characteristics
D_DTR	Exercise printer with DTR flow control
D_XONXOFF	Exercise printer with Xon-Xoff flow control
	<b>Test devices sending to async printers</b>
E_DTRFLOW	Exercise device sending to printer - DTR
	Exercise device sending to printer - Xon/off

### Test async devices across a modem link

F\_BRBRPOLS  
F\_BUFFER

Send 4 pages 81 char with Xon/off & CTS modem link  
Determine printer's buffer character modem link

### Interface tests

I\_AVRTSCTS  
I\_AVTURND  
I\_CDOFF  
I\_CD\_TO\_RD  
I\_CD\_TO\_TD  
I\_CTSTD  
I\_CTS\_ERR  
I\_DSR\_DTR  
I\_LCLTURND  
I\_RMT\_TRND  
I\_RTS\_CTS  
I\_RTS\_ERR  
I\_RTS\_TD

Measure average RTS-CTS time - 10 intervals  
Average remote turn-around time -RTS-CD  
Check for CD off while receiving data  
CD on to received data time  
CD off to transmitted data time  
CTS on to transmitted data time  
Check for CTS off before RTS off  
Detect transitions and glitches on DSR & DTR  
Local turn-around time CD off to RTS on  
RTS off to CD on time  
RTS on to CTS on time  
RTS off while transmitting data  
RTS on to transmit data

### SDLC tests

S\_CNTERRS  
S\_CNTIVALL  
S\_CTSTPRDC  
S\_CTSTPRDT  
S\_HILITFLG  
S\_SNRM  
S\_UTIL

Count DTE & DCE aborts & FCS errors - 60 min  
Count DTE and DCE I-frames and all non I-frames -60 min  
Count DCE XIDs, SNRMs / DTE XIDs, UAs - 60 min  
Count DTE XIDs, SNRMs / DCE XIDs, UAs - 60 min  
Highlight flags on line  
Set leads on, send SNRM, beep on other than UA  
Measure half duplex BOP line utilization -10 min

### Instrument setups

U\_BURS\_SPS  
U\_BUR\_A\_PS  
U\_IPARS  
U-SYALL7  
U\_SYALL8  
U\_UNISCOPE

Setup for sync Burroughs poll select  
Setup for async Burroughs poll select  
Setup for common IPARS system  
Setup to capture all bits on 7 bit sync link  
Setup to capture all bits on 8 bit sync link  
Setup for Uniscope sync link

## 1 - 4 Product Introduction

#### X.25 tests

X_CALLTRYs	Count link attempts and irregular response
X_CNTALLFR	Count DTE + DCE SABM, UA, DISC, FRMR, RNR
X_CNTCALLs	Count DTE & DCE CALLs & CALL ACCEPTs -1 hr
X_CNTCONCT	Count DTE and DCE SABMs and UAs -60 min
X_CNTDCEFR	Count DCE SABM, UA, DISC, FRMR, RNR
X_CNTDCFRT	Count DCE SABM, UA, DISC, FRMR, - 60 min
X_CNTDTEFR	Count DTE SABM, UA, DISC, FRMR, RNR
X_CNTDTFRT	Count DTE SABM, UA, DISC, FRMR - 60 min
X_CNTERRS	Count DCE and DTE aborts and FCS errors - 60 min
X_CNTIVALL	Count DCE and DTE-I frames vs total frames - 10 min
X_DCEUTIL	DCE utilization - 10 min
X_DTEUTIL	DTE utilization - 10 min
X_HILITFLG	Highlight flags
X_LINKUPDN	Bring link up, then down, highlight errors
X_LVLI	Detect control lead and interface problems



## Installing Programs

---

Instructions for loading programs are presented in this section. Also covered are directions for copying the master disc, creating a customized test library, and instructions for printing programs.

---

### Loading a Program from Disc

1. Insert the Data Communications Test Library or your customized test library disc (described on the next page) into the disc drive.
2. Press [MORE], then <Mass Store> to display the disc directory.
3. Use the arrow keys to select and highlight the program of your choice. A description of each test is included in the next section.
4. Press <Load>, then <Execute>. The program you chose is loaded. Press [Exit] to return to the top level. Press <Setup> to check or modify datacom link parameters. If you loaded a Monitor Program, press <Mon Menu> to view or modify it. If you loaded a Simulate Program, press <Sim Menu> to view or modify it.
5. To execute the program at the top menu level, press <Run Menn>, then <Monitor> or <Simulate>, depending on which type of test you loaded.

---

## Copying the Master Disc

The master disc contains the Data Communications Test Library of programs. You must use the basic loading and storing features of the protocol analyzer to copy the programs to a work disc. If you have access to an HP 4952A Protocol Analyzer, and wish to copy the entire disc, you may use the "Copy Disc" utility supplied with the 4952A.

Hewlett-Packard recommends that you copy the programs that you will use from the master disc to a work disc. This disc will be called your "customized test library". New discs must be formatted before you can store on them.

## Creating Your Customized Test Library

1. Insert your master disc (containing the sample programs) into the disc drive.
2. At the top level menu, press [MORE] and <Mass Store>. The disc is read and the directory of files on the disc is displayed.
3. Use the arrow keys to locate and highlight the first program you wish to load.

---

### Note

The order in which you load the programs from the master disc to your customized test library disc will be the order in which they will appear on the disc.

---

4. Press <Load> and <Execute>. The program is now in memory in the protocol analyzer. Datacom link parameters should be checked in the <Setup> menu and modified as needed.
5. If you wish to view or modify the program, follow steps a-d below; otherwise, go directly to step 6.
  - a. Press [Exit].
  - b. Press <Mon Menu> or <Sim Menu> (depending on which type of program you have loaded). Make any changes required to the program for your particular application.

## 2 - 2 Installing Programs

- c. Press [Exit].
- d. From the top level menu, press [More], then <Mass Store>.

---

**Note** Changing some parameters, such as Code, Mode, or Character Framing, may require corresponding changes to the monitor or simulate menus. Programs modified to take advantage of unique HP 4952A features may not run on the HP 4951C.

---

- 6. Press <Store>. Move the cursor to the File Name line and enter the name you wish to call this program. You may use the given default name if you wish. Be sure the File Type is "Menus".
- 7. Remove the master disc and insert your customized test library disc into the disc drive.
- 8. Press <Execute>. When the disc activity stops, the Mass Store menu will return.

Repeat steps 1 through 8 above until you have loaded all the programs you will need on your customized test library disc.

---

## Printing a Program

You may print program listings to help modify or understand a program. Do the following to output a monitor (simulate) program listing to a printer.

### Print setup - HP4951C

- 1. Load the Print Application Program.
  - a. From the top level menu, press [MORE], then <Mass Store>.
  - b. Press [MORE], then <Print Appl>, then <Execute>.

2. Configure the Print Application Program.
  - a. From the top level menu, press [MORE], then <Print>.
  - b. Define the printer parameters.

### **Printing a Monitor (Simulate) Program - HP 4951C.**

1. From the top level menu, press [MORE], then <Print>.
2. Select <Monitor> (<Simulate>), press <Execute>.

### **Print setup - HP 4952A**

1. From the top level menu, press [MORE], then <Remote & Print>.
2. Press <Print Setup> and define the printer parameters.
3. Press the <Save Cnfg> key to save your printer configuration.
4. Press [EXIT] twice to return to the main level menu.

### **Printing a Monitor (Simulate) Program - HP 4952A**

1. Load the program into the protocol analyzer.
2. Press the <Mon Menu> (<Sim Menu>) key.
3. Press [MORE] three times, then <Print Prog> to print the program to the printer.

## **2 - 4 Installing Programs**



## Program Descriptions

---

All programs in this collection use the file name format defined here to aid in locating a desired program on a disc. The first letter of the file name indicates the program application listed in the following table.

- A General purpose asynchronous monitor programs
- B General purpose asynchronous simulate programs
- C Async terminal tests
- D Async printer tests
- E Test devices sending to async printers
- F Test async devices across a modem link
- I Interface tests (level 1)
- S SDLC tests
- U Instrument setups
- X X.25 tests

---

**Note**      Program names appear in the upper right hand corner on the following program description pages.

---

REVISION: (06-25-87)

PROGRAM NAME: A\_COUNTCHAR

PROGRAM PURPOSE: Count DCE and DTE characters for 1 minute (or 10 minutes).  
Useful for checking link throughput, file sizes, etc.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, parity, etc.
2. "Don't Care" characters in Block 2 may be replaced by any desired character string.
3. "Stop Tests" in Block 9 may be removed for 10 minute operation, with minutes counted in counter 1.
4. The first counter 1 test value in Block 9 may be replaced by any desired (minutes - 1) value for different test duration.

Note that high line utilization above 9600 bps may cause the analyzer's buffer to overflow, returning the instrument to top level.

#### RESULTS:

Counter 1: Minutes of test

Counter 2: DTE characters x 1

Counter 3: DTE characters / 1000

Counter 4: DCE characters x 1

Counter 5: DCE characters / 1000

Timer 1: Milliseconds of test

$$\text{DTE chars/sec} = \frac{(\text{Counter 3} \times 1000) + \text{Counter 2}}{(\text{Counter 1} \times 60) + \text{Timer 1}/1000}$$

$$\text{DCE chars/sec} = \frac{(\text{Counter 5} \times 1000) + \text{Counter 4}}{(\text{Counter 1} \times 60) + \text{Timer 1}/1000}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

### 3 - 2 Program Descriptions

REVISION: (06-25-87)

PROGRAM NAME: A\_COUNTPAR

PROGRAM PURPOSE: Count DCE and DTE parity errors for 60 seconds (or ten minutes).  
Parity errors indicate a link problem.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, parity, etc.
2. "Stop Tests" in Block 9 may be removed for 10 minute operation, with minutes counted in counter 1.
3. The first counter 1 test value in Block 9 may be replaced by any desired (minutes - 1) value for other test durations.

#### RESULTS:

Counter 1: Minutes of test

Counter 2: DTE parity errors x 1

Counter 3: DTE parity errors / 1000

Counter 4: DCE parity errors x 1

Counter 5: DCE parity errors / 1000

Timer 1: Milliseconds of test

$$\text{DTE parity errors/sec} = \frac{(\text{Counter 3} \times 1000) + \text{Counter 2}}{(\text{Counter 1} \times 60) + \text{Timer 1}/1000}$$

$$\text{DCE parity errors/sec} = \frac{(\text{Counter 5} \times 1000) + \text{Counter 4}}{(\text{Counter 1} \times 60) + \text{Timer 1}/1000}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: B\_ASC7EVER

PROGRAM PURPOSE: Continuously send ASCII 7 even parity string in which all "R"s have errored parity. Useful for testing device response to parity errors.

OPERATING INSTRUCTIONS: Run simulate

1. Check Setup Menu for proper bit rate.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

RESULTS:

All transmitted "R"s have parity errors.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:(06-25-87)**

**PROGRAM NAME: B\_ASC7ODER**

**PROGRAM PURPOSE:** Continuously send ASCII 7 odd parity string in which all "R"s have errored parity. Useful for testing device response to parity errors.

**OPERATING INSTRUCTIONS:** Run Simulate

1. Check Setup Menu for proper bit rate.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

**RESULTS:**

All transmitted "R"s have parity errors.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION: (06-25-87)   PROGRAM NAME: B\_AUTOBAUD**

**PROGRAM PURPOSE:** Send string so that terminal or printer's configured bit rate will appear on tested device. Useful for determining async device speed. Identifies 1200, 2400, 9600, 19200 devices.

**OPERATING INSTRUCTIONS:** Run simulate

Test sends as DCE; may be changed in Simulate Menu to DTE.

**RESULTS:**

Bit rate of tested device will appear on device.

Note that this test was written for 8 bit ASCII and may not work with 7 bit ASCII data codes.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** B\_BRBRPOLE

**PROGRAM PURPOSE:** Continuously send 81-character string with both Xon/Xoff and DTR flow control. Useful for exercising terminals, printers, and other devices. Lost or errored characters are easily detected visually.

**OPERATING INSTRUCTIONS:** Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

Note that this program sends no carriage-return/line feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

**RESULTS:**

81-character "stair-step" pattern appears on printer or terminal. This pattern is very visually distinctive; errored or lost characters may be detected visually.

Unlisted Counters and Timers may be used in the program, but their contents have no meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** B\_BRBRPOLS

**PROGRAM PURPOSE:** Send approximately 4 pages of an 81-character string with both Xon/Xoff and DTR flow control. Useful for exercising terminals, printers and other devices. Lost or errored characters are easily detected visually.

**OPERATING INSTRUCTIONS:** Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

Note that this program sends no carriage-return/line feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

**RESULTS:**

81-character "stair-step" pattern appears on printer or terminal. This pattern is very visually distinctive; errored or lost characters may be detected visually.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.



**REVISION: (06-25-87)**

**PROGRAM NAME: B\_FOXFLOW**

**PROGRAM PURPOSE:** Send QUICK BROWN FOX message with Xon/Xoff and DTR flow control continuously. Useful for exercising terminals, printers, and other devices. Lost or errored characters are easily detected visually.

**OPERATING INSTRUCTIONS:** Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

**RESULTS:**

QUICK BROWN FOX message sent to terminal or printer. This pattern is very visually distinctive; errored or lost characters may be visually detected.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION: (06-25-87)**

**PROGRAM NAME: C\_ALGNMNT**

**PROGRAM PURPOSE:** Send "cross-hair in square" pattern for terminal display alignment.

**OPERATING INSTRUCTIONS:** Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

**RESULTS:**

"Cross-hair in square" pattern on terminal display.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: C\_RESPTIME

PROGRAM PURPOSE: Measure average and instantaneous response time from DTE carriage-return to DCE prompt. Response time is a key indicator of system loading problems or link errors, and is a major contribution to user dissatisfaction.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test assumes terminal is DTE, host is DCE, carriage-return from terminal gets carriage-return or line-feed, then any prompt character from host.
3. Press Return on terminal as many times as desired.

RESULTS:

Counter 1: Number of responses  
Counter 2: Minutes total resp time

Timer 1: Last response time  
Timer 2: mSec total response time

$$\text{Average response time per/sec} = \frac{(\text{Counter 2} \times 60 + \text{Timer 2}/1000)}{\text{Counter 1}}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: D\_BUFFER

PROGRAM PURPOSE: Determine printer buffer characteristics.

PROGRAM DESCRIPTION: Send Xs until Xoff or DTR off, then 60-character string to visually determine printer buffer after Xoff or DTR off. Incompatibilities between the printer buffer and the sending device flow control response may cause lost characters on printouts.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

Note that this program sends no carriage-return/line feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

RESULTS:

Counter 1: Characters before first flow off  
Counter 2: Characters between flow on/off  
Counter 3: Number of flow off/on cycles

Printer will print X until it sends a flow off (Xoff or DTR off), then "123456789A123456789B123456789C123456789D123456789E123456789" is sent to the printer. The number of characters of this string that are printed indicates the printer's buffer size after flow off.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: D\_DTR

PROGRAM PURPOSE: Exercise a printer with DTR flow control. Program sends 78-character lines of X with carriage return/line feed at the end of each line. See also General purpose async simulate programs.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

RESULTS:

Continuous display of 78-character lines of X.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION: (06-25-87)**

**PROGRAM NAME: D\_XONXOFF**

**PROGRAM PURPOSE:** Exercise a printer with Xon/Xoff flow control. Program sends 78-character lines of X with carriage return/line feed at end of each line. See also General purpose async simulate programs.

**OPERATING INSTRUCTIONS:** Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE; may be changed in Simulate Menu to DTE.

**RESULTS:**

Continuous display of 78-character lines of X.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: E\_DTRFLOW

PROGRAM PURPOSE: Test devices sending to printers with DTR control. Determine how many characters device sends after DTR off. Incompatibilities between the printer buffer and the sending device flow control response may cause lost characters on printouts.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DTE; may be changed in Simulate Menu to DCE.
3. Send large file from host as if printing.

RESULTS:

Counter 2: Number of DTR cycles

Counter 3: Total chars sent with/DTR off

$$\text{Average characters sent with DTR off} = \frac{\text{Counter 3}}{\text{Counter 2}}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: E\_XONXOFF

PROGRAM PURPOSE: Test devices sending to printers with XON/XOFF control. Find how many characters device sends after Xoff. Incompatibilities between the printer buffer and the sending device flow control response may cause lost characters on printouts.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DTE; may be changed in Simulate Menu to DCE.
3. Send large file from host as if printing.

RESULTS:

Counter 2: Number of Xon/Xoff cycles.

Counter 3: Total characters sent after Xoff.

$$\text{Average characters sent after Xoff} = \frac{\text{Counter 3}}{\text{Counter 2}}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.



REVISION: (06-25-87)

PROGRAM NAME: F\_BRBRPOLS

PROGRAM PURPOSE: Send 81-character string with both Xon/off and CTS flow control, (approximately 4 pages). This is useful for testing printers or other devices across modem links. Lost or errored characters are easily detected visually.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DTE.
3. Test expects DSR, CD, and CTS to be high, but beeps if low.
4. Terminal emulator may be used to dial link.

Note that this program sends no carriage-return/line feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

RESULTS:

81-character "stair-step" pattern appears on the printer or terminal at the other end of modem link.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: F\_BUFFER

PROGRAM PURPOSE: Determine printer buffer characteristics across the modem link. Incompatibilities between the printer buffer and the sending device flow control response may cause lost characters on printouts.

PROGRAM DESCRIPTION: Send Xs until Xoff or CTS off, then 60-character string to visually determine printer buffer after Xoff or CTS off.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DTE; may be changed in Simulate Menu to DCE.
3. Test expects DSR, CD, and CTS high, but will beep if they are not.
4. Test raises DTR, RTS.
5. Link may be dialed using terminal emulator.

Note that this program sends no carriage-return/line feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

#### RESULTS:

Counter 1: Characters before first flow off  
Counter 2: Characters between flow on/off  
Counter 3: Number of flow off/on cycles

Printer will print X until it sends a flow off (Xoff or DTR off) then "123456789A123456789B123456789C123456789D123456789E123456789" is sent to the printer. The number of characters of this string that are printed indicates the printer's buffer size after flow TSoFF.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87

PROGRAM NAME: I\_AVRTSCTS

PROGRAM PURPOSE: Measure average RTS to CTS time for 10 intervals. On half duplex systems, RTS to CTS delay is one major factor in link efficiency. Longer time reduces throughput, shorter time increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of RTD to CTS periods

Timer 1: Total RTS to CTS time

$$\text{Average RTS to CTS time} = \frac{\text{Timer 1}}{\text{Counter 1}}$$

Transitions are highlighted in the data and state display.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: I\_AVTURND

PROGRAM PURPOSE: Measure average remote turn-around time (RTS off to CD on) on half duplex link for 5 turn-arounds. Link efficiency is highly affected by turn-around time. Longer time decreases throughput, shorter time increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of turn-arounds

Timer 1: Total turn-around time

$$\text{Average turn-around time} = \frac{\text{Timer 1}}{\text{Counter 1}}$$

Transitions are highlighted in the data and state display.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** I\_CDOFF

**PROGRAM PURPOSE:** Check if CD is off while data is being received. In most systems, CD should be on when receiving data.

**OPERATING INSTRUCTIONS:** Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

**RESULTS:**

Counter 1: Number of characters with Cd off

Characters received with CD off are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** I\_CD\_TO\_RD

**PROGRAM PURPOSE:** Measures time from CD on to received data on half duplex system. Longer time delay reduces throughput, shorter time delay increases error probability.

**OPERATING INSTRUCTIONS:** Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

**RESULTS:**

Timer 1: CD on to received data time

Lead transition and first received character are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** I\_CD\_TO\_TD

**PROGRAM PURPOSE:** Measure time from CD off to transmitted data on half duplex system. Longer time delay reduces throughput, shorter time delay increases error probability.

**OPERATING INSTRUCTIONS:** Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

**RESULTS:**

Timer 1: CD off to transmitted data time

Lead transition and first received character are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** I\_CTSTD

**PROGRAM PURPOSE:** Measure time from CTS on to transmitted data on half duplex system. Longer time delay reduces throughput, shorter time delay increases error probability.

**OPERATING INSTRUCTIONS:** Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

**RESULTS:**

Timer 1: CTS on to transmitted data time

Lead transition and first received character are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.



REVISION: (06-25-87)

PROGRAM NAME: I\_CTS\_ERR

PROGRAM PURPOSE: Detect CTS drop before RTS to indicate link or modem problem.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of illegal transitions

Illegal lead transitions are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: I\_DSR\_DTR

PROGRAM PURPOSE: Detect transitions and glitches on DSR and DTR. In modem link, these leads should generally stay on. Detect "on" to "off" transitions.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: DTR transitions

Counter 2: DSR transitions

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** I\_LCLTURND

**PROGRAM PURPOSE:** Measure local turn-around (Cd off to TRS on) on half duplex system. Longer time delay reduces throughput, shorter time delay increases error probability.

**OPERATING INSTRUCTIONS:** Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

**RESULTS:**

Timer 1: Turn-around time

Lead transitions are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: I\_RMT\_TRND

PROGRAM PURPOSE: Measure time from RTS off to CD on in half duplex system and number of polls before a response. Longer time delay reduces throughput, and shorter time delay increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of polls

Timer 1: First RTS off to CD on

Timer 2: Last poll RTS off to CD on

Lead transitions are highlighted.

If there is only one poll, time measurement is in Timer 1.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION: (06-25-87)**

**PROGRAM NAME: I\_RTS\_CTS**

**PROGRAM PURPOSE:** Measure time from RTS on to CTS on in half duplex system and number of polls before a response. Longer time delay reduces throughput, shorter time delay increases error probability.

**OPERATING INSTRUCTIONS:** Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

**RESULTS:**

Timer 1: First RTS on to CTS on

Lead transitions are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** I\_RTS\_ERR

**PROGRAM PURPOSE:** Detect RTS off while transmitting data. RTS off while DTE is transmitting indicates DTE problem.

**OPERATING INSTRUCTIONS:** Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

**RESULTS:**

Counter 1: Number of characters with RTS off

Characters with RTS off are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: I\_RTS\_TD

PROGRAM PURPOSE: Measure time from RTS on to transmitted data. Longer time delay reduces throughput, shorter time delay increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Timer 1: Time from RTS on to transmitted data

Lead transitions and characters are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION (06-25-87)

PROGRAM NAME: S\_CNTERRS

PROGRAM PURPOSE: Count DCE and DTE aborts and FCS errors for 60 minutes. Aborts may indicate DTE problems, FCS error may indicate link problems.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

RESULTS:

Counter 1: Minutes of test  
Counter 2: DTE aborts  
Counter 3: DCE aborts  
Counter 4: DTE FCS errors  
Counter 5: DCE FCS errors

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.



REVISION: (06-25-87)

PROGRAM NAME: S\_CNTIVALL

PROGRAM PURPOSE: Count DCE/DTE I frames- and all non I-frames for 60 minutes.  
System throughput increases with the number of I frames per total frames.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

RESULTS:

Counter 1: Minutes of test  
Counter 2: DTE all non I-frames  
Counter 3: DTE I-frames  
Counter 4: DCE all non I-frames  
Counter 5: DCE I-frames

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** S\_CTSTPRDC

**PROGRAM PURPOSE:** Count DCE XIDs SNRMs / DTE XIDs, UAs for 60 minutes. This test assumes primary (host) is DCE.

**OPERATING INSTRUCTIONS:** Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

**RESULTS:**

Counter 1: Minutes of test

Counter 2: DCE XIDs

Counter 3: DTE XIDs

Counter 4: DCE SNRMs

Counter 5: DTE UAs

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: S\_CTSTPRDT

PROGRAM PURPOSE: Count DTE XIDs SNRMs / DCE XIDs, UAs for 60 minutes. This test assumes primary (host) is DTE.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

RESULTS:

Counter 1: Minutes of test  
Counter 2: DTE XIDs  
Counter 3: DCE XIDs  
Counter 4: DTE SNRMs  
Counter 5: DCE UAs

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** S\_HILITFLG

**PROGRAM PURPOSE:** Highlight and capture/display only flags on line. Absence of flags indicates inactive device.

**OPERATING INSTRUCTIONS:** Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.

**RESULTS:**

Flags (hex 7E) are highlighted in buffer.  
Only flags are captured or displayed.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: S\_SNRM

PROGRAM PURPOSE: Set leads on, send SNRM, beep on receipt of other than UA, indicating error on part of secondary. This test assumes primary (host) as DCE.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Timeout of 3000 ms may be changed in Timer 1 test in Block 1.

RESULTS:

Beep on timeout (3000 ms) or response other than UA.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: S\_UTIL

PROGRAM PURPOSE: Measure half duplex bit oriented protocol line utilization for 10 minutes.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 10 minutes by changing the statement in Block 3, "If Counter 1 > 9".

RESULTS:

Counter 1: Minutes of test

Counter 2: Minutes used by DTEs

Counter 3: Minutes use by DCE

Timer 1: mSec of test

Timer 2: mSec used by DTE

Timer 3: mSec used by DCE

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION: (06-25-87)**

**PROGRAM NAME: U\_BURS\_SPS**

**PROGRAM PURPOSE:** Setup for synchronous Burroughs poll/select link.

**REVISION: (06-25-87)**

**PROGRAM NAME: U\_BUR\_A\_PS**

**PROGRAM PURPOSE:** Setup for asynchronous Burroughs poll/select link.

**REVISION: (06-25-87)**

**PROGRAM NAME: U\_IPARS**

**PROGRAM PURPOSE:** Setup for common IPARS system.

**REVISION: (06-25-87)**

**PROGRAM NAME: U\_SYALL7**

**PROGRAM PURPOSE:** Setup to capture all bits on 7-bit framed synchronous link. Useful for preliminary analysis of unknown or disfunctional protocol. To maximize buffer utilization, Hewlett-Packard protocol analyzers do not store some data, i.e. bits between frames in bit-oriented setups.

**REVISION: (06-25-87)**

**PROGRAM NAME: U\_SYALL8**

**PROGRAM PURPOSE:** Setup to capture all bits on 8-bit framed synchronous link. Useful for preliminary analysis of unknown or disfunctional protocol. To maximize buffer utilization, Hewlett-Packard protocol analyzers do not store some data, i.e. bits between frames in bit-oriented setups.

**REVISION: (06-25-87)**

**PROGRAM NAME: U\_UNISCOPE**

**PROGRAM PURPOSE:** Setup for Uniscope synchronous link.

**REVISION:** (06-25-87)

**PROGRAM NAME:** X-CALLTRYS

**PROGRAM PURPOSE:** Detect and count link attempts and irregular responses. Irregular response to SABM includes non-UA and non-SABM frames from either side and timeouts. Irregular responses are highlighted. Test duration is 60 minutes.

**OPERATING INSTRUCTIONS:** Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

**RESULTS:**

Counter 1: Minutes of test

Counter 2: DTE link attempts (SABMs)

Counter 3: Irregular response to DTE

Counter 4: DCE link attempts (SABMs)

Counter 5: Irregular response to DCE

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.



REVISION: (06-25-87)

PROGRAM NAME: X\_CNTALLFR

PROGRAM PURPOSE: Count DTE plus DCE total (SABMs, UAs, DISCs, FRMRs, and RNRs). In general, all these numbers should be low.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. This test must be stopped manually [HALT/EXIT].

RESULTS:

Counter 1: (DCE & DTE) total SABMs

Counter 2: (DCE & DTE) total UAs

Counter 3: (DCE & DTE) total DISCs

Counter 4: (DCE & DTE) total FRMRs

Counter 5: (DCE & DTE) total RNRs

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION: (06-25-87)**

**PROGRAM NAME: X\_CNTCALLS**

**PROGRAM PURPOSE:** Count DTE and DCE CALLS and CALL ACCEPTs for 60 minutes. Difference between number of CALLS and CALL ACCEPTs on either side indicates unsuccessful CALLS.

**OPERATING INSTRUCTIONS:** Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

**RESULTS:**

Counter 1: Minutes of test

Counter 2: DTE CALLS

Counter 3: DCE CALL ACCEPTs

Counter 4: DCE CALLS

Counter 5: DTE CALL ACCEPTs

Timer 1: mSec of test

In general, on an X.25 link, the count in counter 2 should be close to the count in counter 3, and the count in counter 4 should be close to the count in counter 5.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X\_CNTCONCT

PROGRAM PURPOSE: Count DTE and DCE SABMs and UAs for 60 minutes. Number of SABMs and UAs should be close to each other, and low for each side.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

RESULTS:

Counter 1: Minutes of test

Counter 2: DTE SABMs

Counter 3: DCE UAs

Counter 4: DCE SABMs

Counter 5: DTE UAs

Timer 1: mSec of test

In general, on an HDLC (X.25) link, the count in counter 2 should be close to the count in counter3, and the count in counter 4 should be close to the count in counter 5.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X\_CNTDCEFR

PROGRAM PURPOSE: Count DCE SABM, UA, DISC, FRMR, and RNR. In general, all should be fairly low numbers.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. This test must be stopped manually [HALT/EXIT].

RESULTS:

Counter 1: DCE SABMs  
Counter 2: DCE UAs  
Counter 3: DCE DISCs  
Counter 4: DCE FRMRs  
Counter 5: DCE RNRs

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X\_CNTDCFRT

PROGRAM PURPOSE: Count DCE SABM, UA, DISC, FRMR for 60 minutes. In general, all should be fairly low numbers.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 . 59".

RESULTS:

Counter 1: Minutes of test

Counter 2: DCE SABMs

Counter 3: DCE UAs

Counter 4: DCE DISCs

Counter 5: DCE FRMRs

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X\_CNTDTEFR

PROGRAM PURPOSE: Count DTE SABM, UA, DISC, FRMR and RNR. In general, all should be fairly low numbers.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. This test must be stopped manually [HALT/EXIT].

RESULTS:

Counter 1: DTE SABMs

Counter 2: DTE UAs

Counter 3: DTE DISCS

Counter 4: DTE FRMRs

Counter 5: DTE RNRs

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X\_CNTDTFRT

PROGRAM PURPOSE: Count DTE SABM, UA, DISC, FRMR for 60 minutes. In general, all should be fairly low numbers.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3 "If Counter 1 > 59".

RESULTS:

Counter 1: Minutes of test

Counter 2: DTE SABMs

Counter 3: DTE UAs

Counter 4: DTE DISCs

Counter 5: DTE FRMRs

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION (06-25-87)**

**PROGRAM NAME: X\_CNTERRS**

**PROGRAM PURPOSE:** Count DCE and DTE aborts and FCS errors for 60 minutes. Abort may indicate DTE problems, FCS error may indicate link problems.

**OPERATING INSTRUCTIONS:** Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

**RESULTS:**

Counter 1: Minutes of test  
Counter 2: DTE aborts  
Counter 3: DCE aborts  
Counter 4: DTE FCS errors  
Counter 5: DCE FCS errors

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.



REVISION: (06-25-87)

PROGRAM NAME: X\_CNTIVALL

PROGRAM PURPOSE: Count DCE/DTE I frames vs total frames. System throughput increases with the number of I frames per total frames. Test duration is 60 minutes.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 60 minutes by changing the statement in Block 3, "If Counter 1 > 59".

RESULTS:

Counter 1: Minutes of test  
Counter 2: DTE all frames  
Counter 3: DTE I-frames  
Counter 4: DCE all frames  
Counter 5: DCE I-frames

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X\_DCEUTIL

PROGRAM PURPOSE: Measure full duplex DCE side bit-oriented protocol line utilization for 10 minutes.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 10 minutes by changing the statement in Block 3, "If Counter 1 > 9".

RESULTS:

Counter 1: Minutes of test

Counter 2: DCE utilized minutes

Timer 1: mSec of test

Timer 2: mSec utilized DCE

$$\text{DCE utilization} = \frac{\text{Counter 2} \times 60 + \text{Timer 2} \times 1000}{\text{Counter 1} \times 60 + \text{Timer 1} \times 1000}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X\_DTEUTIL

PROGRAM PURPOSE: Measure full duplex DTE side Bit-Oriented Protocol line utilization for 10 minutes.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration may be changed from 10 minutes (D-1=9) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test  
Counter 2: DTE utilized minutes

Timer 1: mSec of test  
Timer 2: mSec utilized DTE

$$\text{DTE utilization} = \frac{\text{Counter 2} \times 60 + \text{Timer 2} \times 1000}{\text{Counter 1} \times 60 + \text{Timer 1} \times 1000}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION:** (06-25-87)

**PROGRAM NAME:** X\_HILITFLG

**PROGRAM PURPOSE:** Highlight and capture/display only flags on line. Absence of flags indicates inactive device.

**OPERATING INSTRUCTIONS:** Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.

**RESULTS:**

Flags (hex 7E) are highlighted in buffer.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X\_LINKUPDN

PROGRAM PURPOSE: Bring link up, then down, "beep" and highlight errors.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test is DTE.

RESULTS:

Leads not up, or improper response to SABM, are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

**REVISION: (06-25-87)**

**PROGRAM NAME: X\_LVL1**

**PROGRAM PURPOSE:** Detect control lead and interface problems.

**OPERATING INSTRUCTIONS:**

1. Connect analyzer to X.25 link that should be active.
2. Run monitor program.
3. DTE clock is expected to be supplied by the DCE; it may be changed in the setup menu.

**RESULTS:**

1. No beep indicates all needed leads are high, and presence of flags with clock on both sides of the line.
2. If DSR, CD, or CTS is not high (DCE leads), counter 1 is set to 1 and the analyzer beeps.
3. If DTR or RTS is not high (DTE leads), counter 1 is set to 2 and the analyzer beeps.
4. If no flags are present on the DCE side (pin 3), counter 2 is set to 1 and the analyzer beeps.
5. If no flags are present on the DTE side (pin 2), counter 2 is set to 2 and the analyzer beeps.
6. If flags are not present on either side, check for clocks on POD on pins 15 and 17, or on pin 24 if DTE supplies its own clock.

Counter 1 or 2: value of 1 indicates a modem problem.

Counter 1 or 2: value of 2 indicates a terminal problem.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

# SALES OFFICES

Alphabetically by Country

## HEADQUARTERS OFFICES

*If no T&M sales office is listed for your country or area, please contact one of these headquarters offices.*

### Asia Pacific

Hewlett-Packard Australia Ltd.  
31-41 Joseph Street  
Blackburn, VIC 3130  
**Australia**  
Tel: (61/3) 272-2895  
Fax: (61/3) 898-7831  
Telex: 31024 MELBAA

Hewlett-Packard Asia Pacific Ltd.  
22/F Peregrine Tower, Lippo  
Centre  
89 Queensway, Central  
**Hong Kong**  
Tel: (852) 848-7777  
Fax: (852) 868-4997  
Telex: 76793 HPA HX

Yokogawa Hewlett-Packard Ltd.  
91-1, Takauracho, Hachioji-Shi  
Tokyo 192 **Japan**  
Tel: (81/4) 2648-0652  
Fax: (81/4) 2648-8064

### Canada

Hewlett-Packard (Canada) Ltd.  
5150 Spectrum Way  
Mississauga, **Ontario** L4W 5G1  
Tel: (905) 206-4725  
Fax: (905) 206-4739

### Eastern Central Europe

Hewlett-Packard GmbH  
Liebigasse 1  
P.O. Box 72  
1222 Vienna, **Austria**  
Tel: (43/1) 2500-0  
Fax: (43/1) 2500-444  
Telex: 134-425

### Europe

Hewlett-Packard S.A.  
Route du Nant d'Avril 150  
CH-1217 Meyrin 2  
Geneva, **Switzerland**  
Tel: (41) 22/780-81-11  
Fax: (41) 22/780-85-42  
Telex: 419 019 hps

### Latin America

Hewlett-Packard Co.  
5200 Blue Lagoon Drive,  
9th Floor  
Miami, FL **U.S.A.** 33126  
Tel: (305) 267-4245  
Fax: (305) 267-4288

### Middle East and Africa

Hewlett-Packard S.A.  
International Sales Branch  
Middle East/Africa  
Rue de Veyrot 39  
P.O. Box 364  
1217 Meyrin 1  
Geneva, **Switzerland**  
Tel: (41/22) 780-4111  
Fax: (41/22) 780-4770  
Telex: 418907

### United States

1-800-452-4844

## LOCAL AREA OFFICES

*Arranged alphabetically by country*

### Albania

IBS (Information & Business  
Systems)  
Hewlett-Packard Distributor  
1, Rr. Kongresi Permetit  
**Tirana**  
Tel: 5/4223854  
Fax: 5/4223864

### Algeria

R.T.I.  
Realisation Telematiques  
Internationales  
Lot A, Villa no. 57  
Baba - Hassen  
Wilaya de Tipaza  
**Algeria**  
Tel: (213) 230-6430  
Fax: (213) 230-6431

### Angola

*Handled by HiPerformance,  
South Africa*

### Argentina

Hewlett-Packard Argentina  
Montaneses 2140/50  
1428 **Buenos Aires**  
Tel: (54/1) 781-4059/69  
(54/1) 781-4090

### Australia

#### An Asia Pacific Headquarters Office

Hewlett-Packard Australia Ltd.  
31-41 Joseph Street  
**Blackburn, VIC** 3130  
Tel: (61/3) 272-2895  
Fax: (61/3) 898-7831  
Telex: 31024 MELBAA

### Adelaide

Hewlett-Packard Australia Ltd.  
191 Fullarton Road  
**Dulwich, S.A.** 5065  
Tel: (61/8) 366-5111  
Fax: (61/8) 332-0020

### Canberra

Hewlett-Packard Australia Ltd.  
Thynne Street, Fern Hill Park  
**Bruce, ACT** 2617  
Tel: (61/6) 251-6999  
Fax: (61/6) 251-6948  
Telex: AA 82650

### Melbourne

Hewlett-Packard Australia Ltd.  
31-41 Joseph Street  
**Blackburn, VIC** 3130  
Tel: (61/3) 272-2895  
Fax: (61/3) 898-7831  
Telex: 31024 MELBAA

### Perth

Measurement Innovation (WA)  
Pty. Ltd.  
558 Duncraig Road  
(P.O. Box 313)  
**Applecross, W.A.** 6153  
Tel: (61/9) 316-2757  
Fax: (61/9) 316-1392  
Mobile: 61-18-33-6434

### Sydney

Hewlett-Packard Australia Ltd.  
17-23 Talavera Road  
**North Ryde, N.S.W.** 2113  
Tel: (61/2) 950-7444  
Fax: (61/2) 888-9072

### Austria

#### Eastern Central Europe Headquarters Office

Hewlett-Packard GmbH  
Liebigasse 1  
P.O. Box 72  
1222 **Vienna, Austria**  
Tel: (43/222) 2500-0  
Fax: (43/222) 2500-444  
Telex: 134-425

### Bahrain

BAMTEC  
P.O. Box 10373  
Mezzanine Floor, Al-Hasan Bldg.  
Diplomatic Area  
**Manama**  
Tel: (973) 53-66-43  
Fax: (973) 53-66-67  
Telex: 8550 WAEI BN

---

**Belgium**

Hewlett-Packard Belgium  
S.A./N.V.  
Blvd. de la Woluwe, 100/102  
Woluwedel  
B 1200 Brussels  
Tel: (32/2) 778-34-17  
Fax: (32/2) 778-34-14

---

**Bolivia**

Siser, Ltda  
Pasaje Villegas 1213  
Casilla 4084

**La Paz**

Tel: (59-12) 34-0962  
Fax: (59-12) 35-9268

---

**Brazil**

Edisa Hewlett-Packard S.A.  
Alameda Rio Negro 750  
Alphaville 06454-000  
Barueri São Paulo  
Tel: (55-11) 725-1444  
Fax: (55-11) 725-1244  
Telex: 11-71351

Edisa Hewlett-Packard S.A.  
Rua Lauro Mueller, 116 Grupo  
805  
22290-160-Rio de Janeiro-RJ  
Tel: (55-21) 541-4404  
Fax: (55-21) 295-2195  
Telex: 21-21905

---

**Brunei**

Komputer Wisman Sdn Bhd  
Room 1, 3rd Floor  
Jalan Tutong  
BS Begawan

**Brunei Darussalam**

Tel: (673/2) 23918  
Telex: 0809-2447

---

**Bulgaria**

Technica Ltd.  
Hewlett-Packard Distributor  
Studentsky Grad. Block 61-8  
1100 Sofia  
Tel: 92/626117  
Fax: 92/629058

---

**Canada****Canada Headquarters Office**

Hewlett-Packard (Canada) Ltd.  
5150 Spectrum Way  
Mississauga, Ontario L4W 5G1  
Tel: (905) 206-4725  
Fax: (905) 206-4739

---

**Albarta**

Hewlett-Packard (Canada) Ltd.  
150 6th Avenue S.W.  
Petro-Canada Tower, Suite 3600  
Calgary, Alberta T2P 3Y7  
Tel: (403) 262-0777  
Fax: (403) 237-9309

Hewlett-Packard (Canada) Ltd.  
11120 178th Street  
Edmonton, Alberta T5S 1P2  
Tel: (403) 486-6666  
Fax: (403) 489-8764

**British Columbia**

Hewlett-Packard (Canada) Ltd.  
13575 Commerce Parkway  
Suite 110  
Crestwood Corporate Centre  
Richmond, British Columbia  
V6V 2L1  
Tel: (604) 270-2277  
Fax: (604) 270-0859

**Manitoba**

Hewlett-Packard (Canada) Ltd.  
200 Graham Avenue  
10th Floor, Suite 1000  
Winnipeg, Manitoba R3C 4L5  
Tel: (204) 694-2777  
Fax: (204) 694-3901

**Nova Scotia**

Hewlett-Packard (Canada) Ltd.  
201 Brownlow Avenue  
Dartmouth, Nova Scotia  
B3B 1W2  
Tel: (902) 468-4725  
Fax: (902) 468-4311

**Ontario**

Hewlett-Packard (Canada) Ltd.  
2670 Queensview Drive  
Ottawa, Ontario K2B 8K1  
Tel: (613) 820-6483  
Fax: (613) 820-0377

**Quebec**

Hewlett-Packard (Canada) Ltd.  
17500 Trans Canada Highway  
South Service Road  
Kirkland, Quebec H9J 2X8  
Tel: (514) 697-4232  
Fax: (514) 697-6941

**Saskatchewan**

Hewlett-Packard (Canada) Ltd.  
2175 Airport Drive, #1  
Saskatoon, Saskatchewan  
S7L 7E1  
Tel: (306) 653-6550  
Fax: (306) 664-3879

---

**Chile**

ASC Chile S.A.  
Austria 2041  
Santiago  
Tel: (56-2) 274-7678  
Fax: (56-2) 223-1912

---

**China, People's Republic of**

China Hewlett-Packard Co., Ltd.  
5-6/F West Wing Office  
China World Trade Center  
No. 1 Jian Guo Men Wei Avenue  
Beijing 100004  
Tel: (86/1) 505-3888  
Fax: (86/1) 505-2930  
Telex: 085-22601 CTSHP CN  
Cable: 1920 Beijing

---

**Chengdu**

China Hewlett-Packard Co., Ltd.  
7/F, the Electronic Foreign Trade  
Bldg.  
#88 East 2nd Section,  
Yi-Huan-Lu Road  
Chengdu 610051, PRC  
Tel: (86/28) 673-888  
Fax: (86/28) 662-171

**Guangzhou**

China Hewlett-Packard Co., Ltd.  
Room 1359, Office Tower  
China Hotel, Liu Hua Road  
Guangzhou 510015  
Tel: (86/20) 663-388  
Telex: 085-44888 CHLGZ CN

**Shanghai**

China Hewlett-Packard Co., Ltd.  
Room 638, Office Building  
Shanghai Center  
1376 Nan Jing Road West  
Shanghai 200040  
Tel: (86/21) 279-8668  
Fax: (86/21) 279-8677  
Telex: 086-33577 CHPS8 CN

**Shenzhen**

China Hewlett-Packard Co., Ltd.  
4/F Huaqiang Component  
Building  
Zhenhua Road, Shangbu District  
Shenzhen City 518031  
Tel: (86/755) 368-608  
Fax: (86/755) 363-154

---

**Colombia**

Instrumentacion, S.A.  
Calle 115 No. 11A-10  
Bogota  
Tel: (571) 612-1313  
Fax: (571) 612-0805

---

**Commonwealth of Independent States (Russian Republic)**

Hewlett-Packard Company  
Pokrovski Blvd. 4/17 Kv. 12  
101000 Moscow  
Tel: (007/095) 823-5001  
Fax: (007/095) 230-2611

---

**Costa Rica**

I.S. de Costa Rica  
Calle 25, Avenida 6 & 8, No. 648  
San Jose  
Tel: (506) 33-3722  
Fax: (506) 55-3528

---

**Czech Republic**

Hewlett-Packard Československo  
spo  
Novodvorská 82  
14200 Praha 4  
Tel: 2/4717676  
Fax: 2/47176111

---

**Cyprus**

Telerexa Ltd.  
P.O. Box 1152  
Valentine House  
8 Stassandrou St.  
Nicosia  
Tel: (3572) 445-628  
Fax: (3572) 457-937  
Telex: 5845 tlrx cy

---

**Denmark**

Hewlett-Packard A/S  
Kongevejen 25  
DK-3460 Birkerød  
Tel: (45/45) 99-10-00  
Fax: (45/45) 82-06-30  
  
Hewlett-Packard A/S  
Brenstrupgaardsvej 13  
8200 Aarhus N  
Tel: (45) 8678-3000  
Fax: (45) 8678-3033  
Telex: 37409 hpas dk



## SALES OFFICES

Alphabetically by Country (cont'd)

### Dominican Republic

Esacomp, S.A.  
Avenida John F. Kennedy No. 11  
Edificio Mercantil del Caribe  
**Santo Domingo**  
Tel: (809) 541-3040  
Fax: (809) 563-1259  
Telex: ITT 346-0439

### Ecuador

CYEDE Cia. Ltda.  
Avenida Eloy Alfaro 1749  
**Quito**  
Tel: (593-2) 44-4224  
Fax: (593-2) 44-4223  
Telex: 39322548 CYEDE ED

### Egypt

ORASCOM  
Onsi Sawiris & Co  
P.O. Box 1191  
160, 26th July Street  
**Aguza/Cairo**  
Tel: (202) 302-69-30  
Fax: (202) 344-02-01  
Telex: 92768 orscm un

### El Salvador

IPESA de El Salvador  
29 Avenida Norte 1223  
**San Salvador**  
Tel: (503) 26-6858  
Fax: (503) 52-7772  
Telex: 301 20539 IPESA SAL

### Finland

Hewlett-Packard Oy  
Pispankalliontie 17  
02200 **Espoo (Helsinki)**  
Tel: (358/0) 887-21  
Fax: (358/0) 887-22-77

Hewlett-Packard Oy  
Vainonkatu 9 C  
40100 **Jyväskylä**  
Tel: (358/41) 21-85-11  
Fax: (358/41) 616-517

Hewlett-Packard Oy  
Teknologiantie 6  
90570 **Oulu**  
Tel: (358/81) 5515144  
Fax: (358/81) 5515145

### France

**Aix-en-Provence**  
Hewlett-Packard France  
ZAC de la Robole  
ZI Les Milles  
Rue Pierre Duhem  
13856 **Aix-en-Provence** Cédex 3  
Tel: (33) 42-37-28-00  
Fax: (33) 42-37-28-50

### Bordeaux

Hewlett-Packard France  
Domaine de Pélus  
5, avenue de Pythagore  
33700 **Merignac**  
Tel: (33) 42-37-28-00  
Fax: (33) 42-37-28-50

### Lyon

Hewlett-Packard France  
Europarc du Chêne  
2, Rue Edison  
69500 **Bron**  
Tel: (33) 72-15-17-00  
Fax: (33) 72-15-18-05  
Telex: 310-617

### Orsay

Hewlett-Packard France  
Zone Industrielle de Courtaboeuf  
1, avenue du Canada  
91947 **Les Ulis** Cédex  
Tel: (33/1) 69-82-60-60  
Fax: (33/1) 69-82-60-61  
Telex: 600-048

### Rennes

Hewlett-Packard France  
4, Rue Louis Kerautret-Botmel  
35000 **Rennes**  
Tel: (33) 99-32-56-00  
Fax: (33) 99-32-56-58  
Telex: 740-912

### Rouen

Hewlett-Packard France  
Parc de la Vatine  
3, Rue Jacques Monod  
BP 228  
76136 **Mont-Saint-Aignan**  
Cédex  
Tel: (33) 35-59-19-20  
Fax: (33) 35-59-85-11  
Telex: 770-035

### Toulouse

Hewlett-Packard France  
Innoparc Voie 7  
BP 167  
31676 **Labège** Cédex  
Tel: (33) 61-39-42-42  
Fax: (33) 61-39-10-97  
Telex: 531-639

### Orléans

Hewlett-Packard France  
Parc Tertiaire Héliopolis  
Route de Micy  
45380 **La Chapelle Saint Mesmin**  
Tel: (33) 38-43-94-56  
Fax: (33) 38-88-22-81

### German Federal Republic

#### Headquarters

Hewlett-Packard GmbH  
Herrenberger Strasse 130  
7030 **Böblingen**  
Tel: (49) 7031/14-0  
Fax: (49) 7031/14-1395

Hewlett-Packard GmbH  
Bad Homburg  
Hewlett-Packard Strasse  
61352 **Bad Homburg**  
Tel: (49) 6172/16-0  
Fax: (49) 6172/16-1309

#### Berlin

Hewlett-Packard GmbH  
Lützowplatz 15  
10785 **Berlin**  
Tel: (49) 30/25452-0  
Fax: (49) 30/25452-162

#### Böblingen

Hewlett-Packard GmbH  
Schickardstrasse 2  
71034 **Böblingen**  
Tel: (49) 7031/14-0  
Fax: (49) 7031/14-6429

#### Bonn

Hewlett-Packard GmbH  
Friedrich-Ebert-Allee 26  
53113 **Bonn**  
Tel: (49) 228/23400-1  
Fax: (49) 228/235-315

#### Dortmund

Hewlett-Packard GmbH  
Schleefstrasse 28  
44287 **Dortmund-Aplerbeck**  
Tel: (49) 231/45001-0  
Fax: (49) 231/45001-37

### Hamburg

Hewlett-Packard GmbH  
Überseering 16  
22297 **Hamburg** 60  
Tel: (49) 40/63808-0  
Fax: (49) 40/63808-327

### Hannover

Hewlett-Packard GmbH  
Baumschulenallee 20-22  
30625 **Hannover** 61  
Tel: (49) 511/9577-0  
Fax: (49) 511/9577-126

### Leipzig

Hewlett-Packard GmbH  
Nikolaistrasse 13-23  
04109 **Leipzig**  
Tel: (49) 341/21635-0  
Fax: (49) 341/21635-220

### Mannheim

Hewlett-Packard GmbH  
Rosslauer Weg 2-4  
68309 **Mannheim**  
Tel: (49) 621/7005-0  
Fax: (49) 621/7005-200

### München (Munich)

Hewlett-Packard GmbH  
Eschenstrasse 5  
82024 **Taufkirchen**  
Tel: (49) 89/61412-0  
Fax: (49) 89/61412-300

### Nürnberg

Hewlett-Packard GmbH  
Emmericher Strasse 13  
90411 **Nürnberg** 10  
Tel: (49) 911/9524-0  
Fax: (49) 911/9524-140

### Ratingen

Hewlett-Packard GmbH  
Berliner Strasse 111  
40880 **Ratingen**  
Tel: (49) 2102/494-0  
Fax: (49) 2102/494-300

### Ulm

Hewlett-Packard GmbH  
Messerschmittstrasse 7  
89231 **Neu Ulm**  
Tel: (49) 731/7073-0  
Fax: (49) 731/7073-166

**Waldbronn**

Hewlett-Packard GmbH  
Ermitis-Allee  
76337 **Waldbronn** (Karlsruhe)  
Tel: (49) 7243/602-0  
Fax: (49) 7243/602-512

**Great Britain**

See **United Kingdom**

**Greece**

G-Systems  
Hewlett-Packard Distributor  
1, Hironos Street  
11635 **Athens**  
Tel: (30/1) 7250465  
Fax: (30/1) 7243477

**Guatemala**

IPESA de Guatemala  
Avenida Reforma 3-48, Zona 9  
**Guatemala City**  
Tel: (502-2) 31-4786  
Fax: (502-2) 31-6627  
Telex: 3055765 IPESA GU

**Hong Kong****An Asia Pacific  
Headquarters Office**

Hewlett-Packard (HK) Ltd.  
22/F Peregrine Tower, Lippo  
Centre  
89 Queensway Central  
**Hong Kong**  
Tel: (852) 848-7777  
Fax: (852) 840-1664  
Telex: 76793 HPA HX

**Hungary**

Hewlett-Packard Magyarorszag  
Kft  
Erzsebet kiralyne utja 1/c  
1146 **Budapest**  
Tel: 1/142-09-86  
Fax: 1/122-36-92

**India****Bangalore**

Hewlett-Packard India Pvt. Ltd.  
29 Cunningham Road  
**Bangalore** 560 052  
Tel: (91/812) 265-931  
(91/812) 261-075  
Fax: (91/812) 200-196  
Telex: 845-2773 HP IN

**Bombay**

Hewlett-Packard India Pvt. Ltd.  
Unit-3, B-Wing  
Ground Floor, Neelam Center  
Hind Cycle Road  
Worli, **Bombay** 400 018  
Tel: (91/22) 493-7821  
(91/22) 493-7823  
Fax: (91/22) 493-9478  
Telex: 11-768 12 HPB IN

**Calcutta**

Hewlett-Packard India Pvt. Ltd.  
DBS Executive Centre  
8 Acharya J.C. Bose Road  
**Calcutta** 700-017  
Tel: (91/33) 474-990  
(91/33) 470-400  
Fax: (91/33) 474-614

**Hyderabad**

Hewlett-Packard India Pvt. Ltd.  
9-5-13 Taramandal Complex  
9th Floor, Saifabad  
**Hyderabad** 500 004  
Tel: (91/842) 231-756  
(91/842) 232-413  
(91/842) 241-574  
Fax: (91/842) 841-697 (PP)  
Telex: 425-644 PCO IN

**Madras**

Hewlett-Packard India Pvt. Ltd.  
DBS Executive Centre  
31-A Cathedral Garden Road  
Near Palmgrove Hotel  
**Madras** 600 034  
Tel: (91/44) 479-186  
(91/44) 475-191  
Fax: (91/44) 825-7258  
Telex: 41-8132

**New Delhi**

Hewlett-Packard India Pvt. Ltd.  
Paharpur Business Centre  
21 Nehru Place  
**New Delhi** 110 019  
Tel: (91/33) 470-4000  
(91/11) 647-2311  
(91/11) 647-2328-30  
Fax: (91/11) 646-1117  
Telex: 31-71127 PBC IN

**Indonesia**

P.T. BERCA Hardayaperkasa  
Jl. Taman Tanah Abang III No. 31  
**Jakarta**, Pusat  
Tel: (62/21) 370-758  
(82/21) 385-5381  
(62/21) 385-5382  
(62/21) 370-194  
Fax: (62/21) 380-9166

**Ireland**

Hewlett-Packard Ireland Ltd.  
Hewlett-Packard House,  
Stradbroke Road  
Blackrock, Co. **Dublin**  
Tel: (353/1) 284-4633  
Fax: (353/1) 284-4622  
Telex: 30430

**Iran**

Evertch  
11 bis, rue Toepffer  
1206 **Geneve**  
Tel: 4122/346 92 92  
Fax: 4122/346 86 91  
Telex: 421 787

**Israel**

Computation and Measurement  
Systems (CMS) Ltd.  
11, Hashlosha Street  
**Tel-Aviv** 67060  
Tel: (9723) 538-03-80  
Fax: (9723) 537-50-55  
Telex: 371234 HPCMS

**Italy**

Hewlett-Packard Italiana S.p.A.  
Via G. di Vittorio 9  
20063 **Cernusco s/N (Mi)**  
Tel: (39/2) 92-121  
Fax: (39/2) 92-104-069

**Anzola Emilia Bologna**

Hewlett-Packard Italiana S.p.A.  
Via Emilia, 51/C  
40011 **Anzola Emilia Bologna**  
Tel: (39/51) 73-10-61  
Fax: (39/51) 73-48-30

**Bari**

Hewlett-Packard Italiana S.p.A.  
Via Vilantonio di Cagno, 34  
70124 **Bari**  
Tel: (39/80) 41-07-44  
Fax: (39/80) 41-78-91

**Limite**

Hewlett-Packard Italiana S.p.A.  
Via Nuova Rivoltana, 95  
20090 **Limite (Mi)**  
Tel: (39/2) 92-12-1  
Fax: (39/2) 70-300-456

**Napoli**

Hewlett-Packard Italiana S.p.A.  
Via Emanuele Gianturco 92 G  
80146 **Napoli**  
Tel: (39/81) 73-40-100  
Fax: (39/81) 73-40-216

**Padova**

Hewlett-Packard Italiana S.p.A.  
Località Camin  
Via Belgio 4/D  
35020 **Padova**  
Tel: (39/81) 82-94-411  
Fax: (39/81) 87-01-960

**Roma Eur**

Hewlett-Packard Italiana S.p.A.  
Viale del Tintoretto, 200  
00142 **Roma Eur**  
Tel: (39/6) 54-831  
Fax: (39/6) 54-01-661

**Torino**

Hewlett-Packard Italiana S.p.A.  
Corso Svizzera, 185  
10149 **Torino**  
Tel: (39/11) 74-231  
Fax: (39/11) 77-16 649

**Japan****An Asia Pacific  
Headquarters Office**

Yokogawa-Hewlett-Packard Ltd.  
91-1, Takauracho, Hachioji-Shi  
**Tokyo** 192 Japan  
Tel: (81/4) 2648-0652  
Fax: (81/4) 2648-8064

**Akita**

Yokogawa-Hewlett-Packard Ltd.  
Nihonseimei Akita Chuodori 8ldg.  
4-2-7 Nakadori  
**Akita** 010  
Tel: (81/188) 36-5021  
Fax: (81/188) 36-5099

**Atsugi**

Yokogawa-Hewlett-Packard Ltd.  
9-32 Tamuracho  
**Kanagawa** 243  
Tel: (81/462) 25-0031  
Fax: (81/462) 25-0064

## SALES OFFICES

Alphabetically by Country (cont'd)

### Japan (cont'd)

#### Chiba

Yokogawa-Hewlett-Packard Ltd.  
WBG Malibu East Bldg. 19F  
2-6 Nakase  
Mihama-ku, Chiba-shi  
**Chiba** 261-71  
Tel: (81/43) 297-0581  
Fax: (81/43) 297-0558

#### Fukuoka

Yokogawa-Hewlett-Packard Ltd.  
Daisan Hakata-Kaisei Bldg.  
1-3-6 Hakataekiminami Hakata-ku  
**Fukuoka** 812  
Tel: (81/92) 472-8731  
Fax: (81/92) 473-4745

#### Nachioji

Yokogawa-Hewlett-Packard Ltd.  
9-1 Takakura-cho  
Hachioji-shi  
**Tokyo** 192  
Tel: (81/426) 42-1261  
Fax: (81/426) 45-2631

#### Hiroshima

Yokogawa-Hewlett-Packard Ltd.  
Nissei-Heiwakoen Bldg.  
3-25 Nakajima-cho Naka-ku  
**Niroshima** 730  
Tel: (81/82) 241-0611  
Fax: (81/82) 241-0619

#### Kobe

Yokogawa-Hewlett-Packard Ltd.  
1-3-2 Muroya Nishi-ku  
**Kobe** 651-22  
Tel: (81/78) 993-2600  
Fax: (81/78) 993-2698

#### Koriyama

Yokogawa-Hewlett-Packard Ltd.  
Nihon-Dantai-seimei Bldg.  
21-10 Toramaru-machi  
**Koriyama** 963  
Tel: (81/249) 39-7111  
Fax: (81/249) 39-7234

#### Kumagaya

Yokogawa-Hewlett-Packard Ltd.  
Nissei-Kumagaya Bldg  
2-42 Miya-machi Kumagaya-shi  
**Saitama** 360  
Tel: (81/485) 24-6563  
Fax: (81/485) 24-9050

#### Kyoto

Yokogawa-Hewlett-Packard Ltd.  
Maeda NS Bldg.  
518 Akinono-machi Niijo-Kudaru  
Karasuma Nakakyo-ku  
**Kyoto** 604  
Tel: (81/75) 211-4301  
Fax: (81/75) 211-2833

#### Mito

Yokogawa-Hewlett-Packard Ltd.  
Mito Mitsui Bldg.  
1-4-73 Sannomaru  
**Mito** 310  
Tel: (81/292) 25-7470  
Fax: (81/292) 31-6589

#### Miyazaki

Yokogawa-Hewlett-Packard Ltd.  
Nomura Shoken Bldg.  
4-1-2 Tachibana-dori  
Miyazaki-C.  
**Miyazaki** 880  
Tel: (81/985) 23-7280  
Fax: (81/985) 23-7864

#### Nagano

Yokogawa-Hewlett-Packard Ltd.  
Nagano-Tokyo-kaijo Bldg.  
1081, Minamigata-machi  
**Nagano** 380  
Tel: (81/262) 24-8012  
Fax: (81/262) 24-8016

#### Nagaoka

Yokogawa-Hewlett-Packard Ltd.  
Nagaoka ST Bldg.  
2-5-11 Higashi-Sakanoue-cho  
Nagaoka-shi  
**Nigata** 940  
Tel: (81/258) 32-4005  
Fax: (81/258) 32-4006

#### Nagoya

Yokogawa-Hewlett-Packard Ltd.  
Nagoya Kokusai Center Bldg.  
1-47-1 Nakono, Nakamura-ku  
**Nagoya** 450  
Tel: (81/52) 571-5171  
Fax: (81/52) 565-0896

#### Nara

Yokogawa-Hewlett-Packard Ltd.  
Nissei Nara Ekimae Bldg  
1-1-15 Omiya-cho  
**Nara** 630  
Tel: (81/742) 22-8235  
Fax: (81/742) 22-8219

#### Numazu

Yokogawa-Hewlett-Packard Ltd.  
Nissei-Star Bldg.  
3-8-23 Otemachi Numazu-shi  
**Shizuoka** 410  
Tel: (81/559) 52-2711  
Fax: (81/559) 52-2722

#### Gmiya

Yokogawa-Hewlett-Packard Ltd.  
Mitsui-seimei Omiya Miyamachi  
Bldg.  
2-96-1 Miyamachi Omiya-shi  
**Saitama** 330  
Tel: (81/48) 645-8031  
Fax: (81/48) 645-8001

#### Osaka

Yokogawa-Hewlett-Packard Ltd.  
Chuo Bldg.  
5-4-20 Nishinakajima  
Yodogawa-ku  
**Osaka** 532  
Tel: (81/6) 304-6021  
Fax: (81/6) 304-0216

#### Sapporo

Yokogawa-Hewlett-Packard Ltd.  
Sumitomo-seimei Sapporo Chuo  
Bldg.  
1-1-14 Nanjo-higashi Chuo-ku  
**Nokkaido** 060  
Tel: (81/11) 251-1561  
Fax: (81/11) 222-3239

#### Shinagawa

Yokogawa-Hewlett-Packard Ltd.  
Tokyo-Nissan-Minato Bldg.  
1-6-34 Konan, Minato-ku  
**Tokyo**, 108  
Tel: (81/3) 3458-5411  
Fax: (81/3) 3458-1998

#### Suwa

Yokogawa-Hewlett-Packard Ltd.  
Daimon Bldg.  
139-1 Yaginishi Shimosuwa-cho  
**Suwa-Gun** 393  
Tel: (81/266) 28-8851  
Fax: (81/266) 28-8873

#### Takaido

Yokogawa-Hewlett-Packard Ltd.  
3-29-21 Takaido-higashi  
Suginami-ku  
**Tokyo** 168  
Tel: (81/3) 3331-6111  
Telex: 232 2024 YHPTOK

#### Takasaki

Yokogawa-Hewlett-Packard Ltd.  
Takasaki Daiichi-seimei Bldg.  
116-1 Shin-Machi Takasaki-shi  
**Gunma** 370  
Tel: (81/273) 26-5166  
Fax: (81/273) 26-5417

#### Tohoku

Yokogawa-Hewlett-Packard Ltd.  
Yamaguchi Bldg.  
1-1-31 Ichibancho Aoba-ku  
**Sendai** 980  
Tel: (81/22) 225-1011  
Fax: (81/22) 225-1616

#### Tokyo

Yokogawa-Hewlett-Packard Ltd.  
Shinjuku Daiichi-seimei Bldg  
2-7-1 Nishi-Shinjuku  
Shinjuku-ku  
**Tokyo** 163  
Tel: (81/3) 3348-4611  
Fax: (81/3) 3348-7969

#### Toyota

Yokogawa-Hewlett-Packard Ltd.  
Toyota-Tokyo-kaijo Bldg.  
1-179 Miyuki-honmachi  
**Toyota** 473  
Tel: (81/565) 27-5611  
Fax: (81/565) 27-5400

#### Tsukuba

Yokogawa-Hewlett-Packard Ltd.  
Tsukuba-Mitsui Bldg.  
1-6-1 Takezono  
**Tsukuba** 305  
Tel: (81/298) 51-5141  
Fax: (81/298) 51-5381

#### Utsunomiya

Yokogawa-Hewlett-Packard Ltd.  
Chiyodaseimei-Utsunomiya Bldg  
2-3-1 Odori  
**Utsunomiya** 320  
Tel: (81/286) 33-1153  
Fax: (81/286) 33-1175

#### Yokohama

Yokogawa-Hewlett-Packard Ltd.  
No. 2 Yasuda Bldg.  
3-32-13 Tsuruyacho  
Kanagawa-ku Yokohama-shi  
**Kanagawa** 221  
Tel: (81/45) 312-1252  
Fax: (81/45) 311-0279

---

**Jordan**

Scientific & Medical Supplies Co.  
P.O. Box 1387

**Amman**

Tel: (962/6) 62-49-07  
Fax: (962/6) 62-82-58  
Telex: 21456 sabco jo

---

**Korea**

Samsung Hewlett-Packard Co.  
Ltd.

Samsung Building, 10-16/F  
25-12 Yoido-dong  
Youngdeung po-ku

**Seoul**, 150-010

Tel: (82/2) 769-0114  
Fax: (82/2) 784-7084  
Telex: SAM HP K25166

---

Samsung Hewlett-Packard Co.  
Ltd.

13/F Taegu Bank Bldg.  
118, 2-Ka, Suseong-dong  
Suseong-ku, **Taegu**  
Tel: (82/53) 754-2666  
(82/53) 752-2696  
Fax: (82/42) 752-4696

---

Samsung Hewlett-Packard Co.  
Ltd.

3rd F, Hong In Officetel  
536-9, Bong Myung-dong  
Yusung-gu, **Taejeon**  
Tel: (82/042) 828-6710-4  
Fax: (82/042) 828-6709

---

**Kuwait**

Al-Khaldiya Electronics &  
Electricals Equipment Co.  
P.O. Box 830

**Safat** 13009

Tel: (965/24) 59 815  
Fax: (965/24) 59 852

---

**Lebanon**

Computer Information Systems  
S.A.L.

Jal-El-Dib, Main Road  
CIS Bldg.  
Beirut 6274  
P.O. Box 11-6274

**Dora-Beirut**

Tel: (961/1) 405-413  
Fax: (3579) 514-256  
Telex: 42309 chaxis le

---

---

**Malawi**

Handled by HiPerformance,  
South Africa

---

**Malaysia**

Hewlett-Packard Sales (M) SDN  
BHD

9/F Chung Khiaw Bank Bldg.  
Section 46, Jalan Raja Laut

GPO Box 11119

50736 **Kuala Lumpur**

Tel: (60/3) 298-6555  
Fax: (60/3) 291-5495  
Telex: MA 31011

---

Hewlett-Packard Sales (M) SDN  
BHD

6/F Wisma Penang Garden  
42 Jalan Sultan Ahmad Shah  
10050 **Penang**

Tel: (60/4) 376-532  
(60/4) 376-887  
Fax: (60/4) 371-027  
Telex: MA 41111

---

**Mauritius**

Handled by HiPerformance,  
South Africa

---

**Mexico**

Hewlett-Packard de Mexico  
Monte Pelvoux No. 111

Col. Lomas de Chapultepec  
11000 **Mexico**, D.F.  
Tel: (52 5) 326-4000  
Fax: (52 5) 540-4208

---

**Morocco**

SICOTEL

Complexe des Habous  
Tour C, avenue des Far  
**Casablanca** 01

Tel: (212) 231-22-70  
Fax: (212) 231-65-45  
Telex: 27604

---

**Mozambique**

Handled by HiPerformance,  
South Africa

---

**Nambia**

Handled by HiPerformance,  
South Africa

---

---

**The Netherlands**

Hewlett-Packard Nederland B.V.  
Postbox 667

1180 AR **Amstelveen**

Tel: (31/20) 547-6969  
Fax: (31/20) 647-8706

---

**New Zealand**

Hewlett-Packard (N.Z.) Ltd.

186-190 Willis Street  
P.O. Box 9443

**Wellington**

Tel: (64/4) 382-0400  
Fax: (64/4) 384-3380

---

**Nigeria**

Management Information Systems  
Co. Ltd.

3 Gerrard Road  
P.O. Box 53386

Ikoyi, **Lagos**

Tel: 01/685 488  
Fax: 01/685 487 (8)  
Telex: 23582 DATEC NG

---

**Norway**

Hewlett-Packard Norge A/S  
Drammensveien 169

P.O. Box 60 Skøyen  
N-0212 **Oslo**  
Tel: (47) 22-73-56-00  
Fax: (47) 22-73-56-19

---

Hewlett-Packard Norge A/S

Boehmergt. 44  
N-5037 **Solheimsviken**  
Tel: (47) 55-29-00-90  
Fax: (47) 55-29-10-72

---

**Oman**

IMTAC LLC  
P.O. Box 51196

Mina al Fahal

**Muscat**

Tel: (968) 707-727  
(968) 707-723  
Fax: (968) 796-639  
(968) 797-709

---

---

**Pakistan**

Mushko Electronics (PVT) Ltd.  
68-W Sama Plaza

Blue Area, G-7

**Islamabad** 44000

Tel: (92/51) 816-190  
(92/51) 828-459

Fax: (92/51) 821-201  
Telex: 54001 Muski Pk

---

Mushko Electronics (PVT) Ltd.

Oosman Chambers  
Abdullah Haroon Road

**Karachi** 74400

Tel: (92/21) 524-131  
(92/21) 524-132

Fax: (92/21) 568-2298  
Telex: 29094 MUSKO PK

---

**Panama**

Electronico Balboa, S.A.  
Ave. El Paiscal #30

Edificio El Dorado  
Apartado 4929

**Panama 5**

Tel: (507) 36-0722  
Fax: (507) 36-1820  
Telex: 368-3483 ELECTRON PG

---

**Paraguay**

ECSA Equipos Contables S.A.  
Calle Estados Unidos No. 961

**Asuncion**

Tel: (595-21) 49-0076  
Fax: (595-21) 49-7849

---

**Pero**

Cia Electro Médica, S.A.  
Los Flamencos No. 145

Oficina 301-302

San Isidro, **Lima** 1

Tel: (51-14) 41-4325

Fax: (51-14) 42-5745

Telex: 39425257 PE PB SIS

---

**Philippines**

The Online Advanced Systems  
Corp.

2/F, Electra House

115-117 Esteban Street

Legaspi Village, Makati

Metro **Manila**

Tel: (63/2) 815-3810 to 16

Fax: (63/2) 816-0590

Telex: 63/2 663-274 ONLINE PN

---

## SALES OFFICES

Alphabetically by Country (cont'd)

### Poland

Hewlett-Packard Polska  
Ul. Nowelska 6  
01-447 **Warszawa**  
Tel: 22/375065  
Fax: 22/374783  
Telex: 813919

### Portugal

Hewlett-Packard Portugal S.A.  
Rua Gregório Lopes, Lote 1732A  
Torre de Santo António  
1400 **Lisboa**  
Tel: (351/1) 301 7330  
Fax: (351/1) 301 6332/3

### Puerto Rico

Hewlett-Packard Puerto Rico  
(3175)  
Metro Office  
Texaco Plaza, Suite 100  
**Caparra Heights**, PR 00920-1705  
Tel: (809) 793-7800  
Fax: (809) 749-5325

### Qatar

Qatar Datamations Systems  
KDS Bldg. 2  
Mezzanine Floor  
Chartered Bank Bldg  
Al-Sudd Str  
P.O. Box 350  
**Ooha**  
Tel: 974/44 19 16  
Fax: 974/44 12 19  
Telex: 4833

### Romania

Barbatan (Romania) Technics Srl  
Hewlett-Packard Distributor  
Calea Dorobanti 103-105  
Et. 6, Cam. 610, Sec. 1  
**Bucuresti**  
Tel: 1/3111291  
Fax: 1/3110185

### Saudi Arabia

Modern Electronics Establishment  
P.O. Box 2769  
King Abdul Aziz Street  
**Al-Khobar** 31952  
Tel: (966/3) 895-6548  
(966/3) 895-1764  
Fax: (966/3) 894-4658  
Telex: 871106 HPMEEK SJ  
Cable: ELECTA, AL-KHOBAR

Modern Electronics Establishment  
P.O. Box 1228  
Zaben Bldg., Tahliat Street  
**Jeddah** 21431  
Tel: (966/2) 661-1447  
Fax: (966/2) 661-0857  
Telex: 602712 FARNAS SJ  
Cable: ELECTA, JEODAH

Modern Electronics Establishment  
P.O. Box 22015  
Prince Musad Ibn Abdulaziz Street  
**Riyadh** 11495  
Tel: (966/1) 476-3030  
Fax: (966/1) 476-7649  
(966/1) 476-2570  
Telex: 402049 MEERYD SJ  
Cable: ROUFKO

### Singapore

Hewlett-Packard Singapore  
(Sales) Pte. Ltd.  
150 Beach Road  
#29-00 Gateway West  
**Singapore** 0718  
Tel: (65) 291-9088  
Fax: (65) 296-8903  
(65) 292-4526  
Telex: 087-34209 HPSGSO RS

### Slovak Republic

High Performance Systems  
Hewlett-Packard Distributor  
Polianky 5  
844 14 **Bratislava**  
Tel: 7/760217  
Fax: 7/763408

### Slovenia, Croatia, Macedonia

Hermes-Plus  
Hewlett-Packard Distributor  
Celovska 73  
61000 Ljubljana  
**Slovenia**  
Tel: 61/193322  
Fax: 61/55597

### South Africa

HiPerformance Systems (Pty.)  
Ltd.  
P.O. Box 120, Howard Place  
**7450 Cape Town**  
Tel: (27/21) 685-7922  
Fax: (27/21) 685-3785

HiPerformance Systems (Pty.)  
Ltd.  
Private 8ag, Wendywood  
**2144 Sandton**  
Tel: (27/11) 806-1000  
Fax: (27/11) 806-1213

### Spain

#### Barcelona

Hewlett-Packard Española, S.A.  
Avenida Diagonal, 605  
**08028 Barcelona**  
Tel: (34/3) 401-91-00  
Fax: (34/3) 430-84-68  
Telex: 52603

#### Bilbao

Hewlett-Packard Española, S.A.  
Edificio El Abra, 4  
48930 Las Arenas. **Guecho**  
Tel: (34/4) 481-80-00  
Fax: (34/4) 481-80-40  
Telex: 33032

#### Madrid

Hewlett-Packard Española, S.A.  
Carretera Nacional VIQKm 16.500  
28230 Las Rozas

#### Madrid

Tel: (34/1) 626-16-00  
Fax: (34/1) 626-18-30  
Telex: 23515

#### Sevilla

Hewlett-Packard Española, S.A.  
c/Luis de Morales, 32  
Edificio Forum  
41018 **Sevilla** Luis de Morales,  
s/n  
Tel: (34/54) 53-29-10  
Fax: (34/54) 53-30-92  
Telex: 72933

#### Valencia

Hewlett-Packard Española, S.A.  
Plaza de América, 2-5ª Planta  
**46004 Valencia**  
Tel: (34/6) 395-74-75  
Fax: (34/6) 395-42-11  
Telex: 63435

### Sri Lanka

Precision Technical Services  
(PVT) Ltd.  
65/14, Park Street  
**Colombo 2**  
Tel: (941) 687791/2  
(941) 687711  
Fax: (941) 687731

### Suriname

Suritel, Co., Inc.  
Grote Holstraat 3-5  
P.O. Box 155  
**Paramaribo**  
Tel: (597) 47-7880  
Fax: (597) 42-0053

### Sweden

#### Göteborg

Hewlett-Packard Sverige AB  
Vadursgatan 6  
Box 5328  
**402 27 Göteborg**  
Tel: (46/31) 35-18-00  
Fax: (46/31) 35-18-99

#### Malmö

Hewlett-Packard Sverige AB  
Jagersrovägen 160  
Box 28066  
**200 28 Malmö**  
Tel: (46/40) 22-79-00  
Fax: (46/40) 22-79-99

#### Service Office

Hewlett-Packard Sverige AB  
Arabygatan  
Box 3161  
**350 43 Växjö**  
Tel: (46/470) 396-06  
Fax: (46/470) 396-07

### Switzerland

#### Europe Headquarters Office

Hewlett-Packard S.A.  
Route du Nant d'Avril 150  
CH-1217 Meyrin 2  
**Geneva**, Switzerland  
Tel: (41) 22/780-81-11  
Fax: (41) 22/780-85-42  
Telex: 419 019 hps

#### Middle East and Africa Headquarters Office

Hewlett-Packard S.A.  
International Sales Branch  
Middle East/Africa  
Rue de Veyrot 39  
P.O. Box 364  
1217 Meyrin 1  
**Geneva**, Switzerland  
Tel: (41/22) 780-4111  
Fax: (41/22) 780-4770  
Telex: 418907

**Bern**

Hewlett-Packard (Schweiz) AG  
Meriedweg 11  
CH-3172 Niederwangen/Bern  
Tel: (031) 980-31-11

**Meyrin**

Hewlett-Packard (Suisse) AG  
39, rue de Veyrot  
CH-1217 Meyrin 1  
Tel: (022) 730-41-11

**Urdorf**

Hewlett-Packard (Schweiz) AG  
In der Luberzen 29  
CH-8902 Urdorf  
Tel: (41) 1-735 71 11  
Fax: (41) 1-735 77 00

**Taiwan, ROC**

Hewlett-Packard Taiwan Ltd.,  
11/F, 456 Chung Hsiao 1st Road  
**Kaohsiung**  
Tel: (886/7) 241-2318  
Fax: (886/7) 251-4619

Hewlett-Packard Taiwan Ltd.  
No. 20, Kao-Shuang Road  
Ping-Chen 32404

**Taoyuan Hsien**

Tel: (886/3) 492-9666  
Fax: (886/3) 492-8087

Hewlett-Packard Taiwan Ltd.  
10/F, 540, Sec. 1  
Wen-Hsin Road

**Taichung**

Tel: (886/4) 327-0153  
Fax: (886/4) 326-5274

Hewlett-Packard Taiwan Ltd.  
8/F Hewlett-Packard Building  
No. 337 Fu-Hsing North Road  
**Taipei** 10483  
Tel: (886/2) 712-0404  
Fax: (886/2) 718-2928  
Telex: 078 924439 HEWPACK

**Thailand**

Hewlett-Packard (Thailand) Ltd.  
11/F Pacific Place  
140 Sukhumvit Road  
**Bangkok** 10110  
Tel: (66/2) 254-6720  
Fax: (66/2) 254-6731  
Telex: 086 22094 HPTLSO TH

**Trinidad and Tobago**

Borde Communications  
1 Valsayn Road  
Curepe, P.O. Box 897  
**Port-of-Spain, Trinidad**  
Tel: (809) 663-2087  
Fax: (809) 625-3352

**Tunisia**

Precision Electronique  
5, rue de Chypre—Mutuelle Ville  
**1002 Tunis Belvedere**  
Tel: (216/1) 785-037  
(216/1) 890-672  
Fax: (216/1) 780-241  
Telex: (0409) 18238 TELECOM TN

**Turkey****Ankara**

Hewlett-Packard  
Bilgisayar ve Olcum Sistemleri  
A.S.  
Paris Cad No3 D.9  
**06670 Kavaklıdere Ankara**  
Tel: 090 (4) 425-83-13  
Fax: 090 (4) 425-47-45  
Telex: 46180

**Istanbul**

Hewlett-Packard  
Bilgisayar ve Olcum Sistemleri  
A.S.  
19 Mayıs Caddesi, Nova/Baran  
Plaza K. 12  
**Sisli 80220 Istanbul**  
Tel: (1) 224 59 25 (12 lines)  
Fax: (1) 224 59 39

**United Arab Emirates**

Emtac Ltd.  
P.O. Box 2711  
**Abu Dhabi**  
Tel: (971/2) 77-04-19  
Fax: (971/2) 72-30-58  
Telex: 46306

Emtac Ltd.  
Block RSB Arenco Bldg.  
Zabel Road  
P.O. Box 8391  
**Dubai**  
Tel: (971/4) 37-75-91  
Fax: (971/4) 37-08-99  
Telex: 48710

**United Kingdom****England****Bracknell**

Hewlett-Packard Limited  
Cam Road  
**Bracknell**  
Berkshire RG12 1HN  
Tel: (44/344) 362-867  
Fax: (44/344) 362-852  
Telex: 849 555

**Manchester**

Hewlett-Packard Limited  
Heathside Park Road  
Cheadle Heath  
**Stockport**  
Cheshire SK3 0RB  
Tel: (44/61) 428-0828  
Fax: (44/61) 495-5009  
Telex: 668 068

**United States****Alabama**

Hewlett-Packard Co. (3114)  
620 Discovery Drive  
**Huntsville, AL 35806**  
Tel: (205) 971-2000  
Fax: (205) 971-8899

**Arizona**

Hewlett-Packard Co. (2401)  
8080 Pointe Parkway West  
**Phoenix, AZ 85044**  
Tel: (602) 273-8000  
Fax: (602) 273-8022  
(602) 438-2355

Hewlett-Packard Co. (2406)  
3400 E. Britannia Drive  
Bldg. C, Suite 124  
**Tucson, AZ 85706**  
Tel: (602) 573-7400  
Fax: (602) 573-7429

**California**

Hewlett-Packard Co. (2403)  
1421 S. Manhattan Avenue  
**Fullerton, CA 92631**  
Tel: (714) 999-6700  
Fax: (714) 758-7559

Hewlett-Packard Co. (2438)  
130 Cremona, Suite A  
**Goleta, CA 93117**  
Tel: (805) 685-6100  
Fax: (805) 685-6163

**Irvine (see Fullerton)**

Hewlett-Packard Co. (2417)  
5245 Pacific Concourse Drive,  
Suite 100  
**Los Angeles, CA 90045**  
Tel: (310) 643-5112  
Fax: (310) 535-2601

Hewlett-Packard Co. (2407)  
351 E. Evelyn Avenue,  
Bldg. 333  
**Mountain View, CA 94039**  
Tel: (415) 694-2000  
Fax: (415) 694-3594

Hewlett-Packard Co. (2415)  
3831 N. Freeway Blvd.  
**Sacramento, CA 95834**  
Tel: (916) 567-8500  
Fax: (916) 567-8777  
(916) 567-8778

Hewlett-Packard Co. (2404)  
9606 Aero Drive  
**San Diego, CA 92123**  
Tel: (619) 279-3200  
Fax: (619) 268-8487  
(619) 279-0560

**Santa Barbara (see Goleta)**

Hewlett-Packard Co. (2428)  
5805 Sepulveda Blvd., Suite 690  
**Van Nuys, CA 91411**  
Tel: (818) 786-5800  
Fax: (818) 779-2350

**Ventura (see Van Nuys)****Colorado**

Hewlett-Packard Co. (2441)  
3005 Center Green Drive, Suite  
205  
**Boulder, CO 80301**  
Tel: (303) 938-3065  
Fax: (303) 938-3025

Hewlett-Packard Co. (2411)  
24 Inverness Place East  
**Englewood, CO 80112**  
Tel: (303) 649-5000  
Fax: (303) 649-5787

**Connecticut**

Hewlett-Packard Co. (4457)  
4 Stamford Forum, 9th Floor  
**Stamford, CT 06901**  
Tel: (203) 324-1003  
Fax: (203) 325-5680

## SALES OFFICES

Alphabetically by Country (cont'd)

### United States (cont'd)

Hewlett-Packard Co. (4458)  
115 Glastonbury Blvd.  
**Glastonbury, CT 06033**  
Tel: (203) 633-8100  
Fax: (203) 659-6087

**District of Columbia**  
(see **Rockville, MD**)

### Florida

#### Latin America Headquarters Office

Hewlett-Packard Co.  
5200 Blue Lagoon Drive, 9th Floor  
**Miami, FL 33126**  
Tel: (305) 267-4245  
Fax: (305) 267-4288

Hewlett-Packard Co. (3179)  
5900 N. Andrews, Suite 100  
**Fort Lauderdale, FL 33309**  
Tel: (305) 938-9800  
Fax: (305) 938-2293

Hewlett-Packard Co. (3171)  
255 E. Drive, Suite 8  
**Melbourne, FL 32904**  
Tel: (407) 729-0704  
Fax: (407) 952-7801

Hewlett-Packard Co. (3177)  
6177 Lake Ellenor Drive  
**Orlando, FL 32809**  
Tel: (407) 859-2900  
Fax: (407) 826-9309

Hewlett-Packard Co. (3166)  
5550 Idlewild, Suite 150  
**Tampa, FL 33634**  
Tel: (813) 884-3282  
Fax: (813) 889-4445

### Georgia

Hewlett-Packard Co. (3108)  
1995 N. Park Place  
**Atlanta, GA 30339**  
Tel: (404) 955-1500  
Fax: (404) 980-7010

### Hawaii

Hewlett-Packard Co. (2409)  
3660 Waialae Avenue, Suite 102  
**Honolulu, HI 96816**  
Tel: (808) 732-1566

### Illinois

Hewlett-Packard Co. (2619)  
2205 E. Empire Street  
**Bloomington, IL 61704**  
Tel: (309) 662-9411  
Fax: (309) 662-0351

Hewlett-Packard Co. (2603)  
1200 E. Diehl Road  
**Naperville, IL 60566**  
Tel: (708) 505-8800  
Fax: (708) 505-7876

Hewlett-Packard Co. (2601)  
5201 Tollview Drive  
**Rolling Meadows, IL 60008**  
Tel: (708) 255-9800  
Fax: (708) 255-4995

### Indiana

Hewlett-Packard Co. (2605)  
201 W. 103rd Street, Suite 100  
**Indianapolis, IN 46290**  
Tel: (317) 844-4100  
Fax: (317) 843-1291

Hewlett-Packard Co. (2635)  
111 E. Ludwig Road, Suite 108  
**Ft. Wayne, IN 46825**  
Tel: (219) 482-4283  
Fax: (219) 480-3730

### Iowa

Hewlett-Packard Co. (2612)  
4050 River Center Court  
**Cedar Rapids, IA 52402**  
Tel: (319) 393-0606  
Fax: (319) 378-1024

### Kansas

Hewlett-Packard Co. (2622)  
P.O. Box 780408  
3450 N. Rock Road, Suite 300  
**Wichita, KS 67278**  
Tel: (316) 636-4040  
Fax: (316) 636-4504

### Kentucky

Hewlett-Packard Co. (2623)  
305 N. Hurstbourne Parkway  
Suite 100  
**Louisville, KY 40222-5141**  
Tel: (502) 426-0100  
Fax: (502) 426-0322

### Maryland

Hewlett-Packard Co. (4432)  
3701 Koppers Street  
**Baltimore, MD 21227**  
Tel: (410) 644-5800  
Fax: (410) 362-7650

Hewlett-Packard Co. (4430)/(4400)  
2101 Gaither Road  
**Rockville, MD 20850**  
Tel: (301) 258-2000  
Fax: (301) 258-5986

### Massachusetts

Hewlett-Packard Co. (4450)  
29 Burlington Mall Road  
**Burlington, MA 01803-4182**  
Tel: (617) 270-7000  
Fax: (617) 221-5240

### Michigan

Hewlett-Packard Co. (2617)  
3033 Orchard Vista S.E., Suite 100  
**Grand Rapids, MI 49546**  
Tel: (616) 957-1970  
Fax: (616) 956-9022

Hewlett-Packard Co. (2607)  
39550 Orchard Hill Place Drive  
**Novi, MI 48376**  
Tel: (313) 349-9200  
Fax: (313) 349-9240

### Minnesota

Hewlett-Packard Co. (2606)  
2025 W. Larpentur Avenue  
**St. Paul, MN 55113**  
Tel: (612) 644-1100  
Fax: (612) 641-9787

### Missouri

Hewlett-Packard Co. (2611)  
6601 Winchester Avenue  
P.O. Box 18230  
**Kansas City, MO 64133-8230**  
Tel: (816) 737-0071  
Fax: (816) 737-4690

Hewlett-Packard Co. (2610)  
530 Maryville Centre Drive  
**St. Louis, MO 63141**  
Tel: (314) 542-1500  
Fax: (314) 542-1585

### Nebraska

Hewlett-Packard Co. (2616)  
2533 N. 117th Avenue  
**Omaha, NE 68164**  
Tel: (402) 493-0300  
Fax: (402) 493-4334

### New Jersey

Hewlett-Packard Co. (4415)  
West 120 Century Road  
**Paramus, NJ 07653**  
Tel: (201) 599-5000  
Fax: (201) 599-5382

Hewlett-Packard Co. (4417)  
20 New England Avenue, West  
**Piscataway, NJ 08854**  
Tel: (908) 562-6100  
Fax: (908) 562-6246

### New Mexico

Hewlett-Packard Co. (2402)  
5130 Masthead N.E.  
**Albuquerque, NM 87109**  
Tel: (505) 823-6100  
Fax: (505) 823-1243

Hewlett-Packard Co. (2420)  
1362-C Trinity Drive  
**Los Alamos, NM 87544**  
Tel: (505) 662-6700  
Fax: (505) 662-4312

### New York

Hewlett-Packard Co. (4444)  
114 Great Oaks Office Park  
**Albany, NY 12203**  
Tel: (518) 452-9947  
Fax: (518) 452-8989

**Buffalo** (see **Cheektowaga**)

Hewlett-Packard Co. (4445)  
Airport Commerce Park  
305 Cayuga Road, Suite 160  
**Cheektowaga, NY 14225**  
Tel: (716) 264-4100  
Fax: (716) 264-4150

Hewlett-Packard Co. (4442)  
290 Woodcliff Drive  
**Fairport, NY 14450**  
Tel: (716) 264-4000  
Fax: (716) 264-4150

**Huntington** (see **Melville**)

Hewlett-Packard Co. (4440)  
5010 Campuswood Drive  
**East Syracuse, NY 13057**  
Tel: (315) 463-2727  
Fax: (315) 463-3150

Hewlett-Packard Co. (4411)  
7 Old Sod Farm Road  
**Melville, NY 11747**  
Tel: (516) 753-0555  
Fax: (516) 753-3469

**Rochester** (see **Fairport**)

Hewlett-Packard Co. (4409)  
Executive Square Office Bldg.  
66 Middlebush Road  
**Wappingers Fall, NY 12590**  
Tel: (914) 298-9125  
Fax: (914) 298-3338

**North Carolina**

Hewlett-Packard Co. (3142)  
2000 Regency Parkway, Suite 600  
**Cary, NC 27511**  
Tel: (919) 467-6600  
Fax: (919) 460-2296  
(919) 460-2297

Hewlett-Packard Co. (3145)  
9401 Arrowpoint Blvd.  
**Charlotte, NC 28210**  
Tel: (704) 527-8780  
Fax: (704) 559-7444

Hewlett-Packard Co. (3111)  
7029 Albert Pick Road, Suite 100  
**Greensboro, NC 27409**  
Tel: (919) 665-1800  
Fax: (919) 668-1797  
Mailing Address  
P.O. Box 26500  
Greensboro, NC 27426

**Raleigh (see Cary)****Ohio**

Hewlett-Packard Co. (2624)  
4501 Erskine Road  
**Cincinnati, OH 45242**  
Tel: (513) 891-9870  
Fax: (513) 891-0033

**Cleveland (see Strongsville)**

Hewlett-Packard Co. (2514)  
540 Office Center Place  
**Columbus, OH 43230-5321**  
Tel: (614) 478-6200  
Fax: (614) 478-6299

Hewlett-Packard Co. (2604)  
7887 Washington Village Drive  
**Dayton, OH 45459**  
Tel: (513) 433-2223  
Fax: (513) 433-8633

Hewlett-Packard Co. (2608)  
15885 Sprague Road  
**Strongsville, OH 44136**  
Tel: (216) 243-7300  
Fax: (216) 234-7230

**Oklahoma**

Hewlett-Packard Co. (3182)  
3525 N.W. 56th Street, Suite C  
**Oklahoma City, OK 73112**  
Tel: (405) 946-9499  
Fax: (405) 948-4760

Hewlett-Packard Co. (3183)  
6655 S. Lewis, Suite 105  
**Tulsa, OK 74136**  
Tel: (918) 481-2285  
Fax: (918) 481-2250

**Oregon**

Hewlett-Packard Co. (2413)  
15115 S.W. Sequoia Parkway,  
Suite 100  
**Portland, OR 97224**  
Tel: (503) 598-8000  
Fax: (503) 598-8155

**Pennsylvania**

Hewlett-Packard Co. (2609)  
111 Zeta Drive  
**Pittsburgh, PA 15238**  
Tel: (412) 782-0400  
Fax: (412) 784-3340

Hewlett-Packard Co. (4420)  
2750 Monroe Blvd.  
**Valley Forge, PA 19482-0713**  
Tel: (215) 666-9000  
Fax: (215) 666-2034

**Tennessee**

Hewlett-Packard Co. (3117)  
404 BNA Drive  
**Nashville, TN 37217**  
Tel: (615) 367-4700  
Fax: (615) 399-4616

**Texas**

Hewlett-Packard Co. (3197)  
9050 Capital of Texas Hwy., North  
Suite 290  
**Austin, TX 78759**  
Tel: (512) 346-3855  
Fax: (512) 338-7278

**Dallas (see Richardson)**

Hewlett-Packard Co. (2405)  
5700 Cromo Drive, Suite 100  
**El Paso, TX 79912**  
Tel: (915) 833-4400  
Fax: (915) 833-4444

Hewlett-Packard Co. (3187)  
2000 W. Loop South  
**Houston, TX 77027**  
Tel: (713) 439-5300  
Fax: (713) 439-5495

Hewlett-Packard Co. (3185)  
930 E. Campbell Road  
**Richardson, TX 75081**  
Tel: (214) 231-6101  
Fax: (214) 699-4337

Hewlett-Packard Co. (3188)  
14100 San Pedro Avenue, Suite  
100  
**San Antonio, TX 78232**  
Tel: (512) 494-9336  
Fax: (512) 491-1299

**Utah**

Hewlett-Packard Co. (2412)  
3530 W. 2100 S.  
**Salt Lake City, UT 84119**  
Tel: (801) 974-1700  
Fax: (801) 974-1780

**Virginia**

**Chesapeake (see Glen Allen)**  
Hewlett-Packard Co. (3113)  
4401 Waterfront Drive, Suite 150  
**Glen Allen, VA 23060**  
Tel: (804) 747-7750  
Fax: (804) 965-9297

**Norfolk (see Glen Allen)****Richmond (see Glen Allen)****Roanoke (see Glen Allen)****Washington**

Hewlett-Packard Co. (2410)  
15815 S.E. 37th Street  
**Bellevue, WA 98006**  
Tel: (206) 643-4000  
Fax: (206) 643-8748

**Wisconsin**

Hewlett-Packard Co. (2615)  
275 N. Corporate Drive  
**Brookfield, WI 53045**  
Tel: (414) 792-8800  
Fax: (414) 792-0218

**Uruguay**

Conatel, S.A.  
Ejido No. 1690  
**Montevideo**  
Tel: (598) 292-0314  
(598) 292-0660

**Venezuela**

Hewlett-Packard de Venezuela  
3ra. Transversal Los Ruices Norte  
Edificio Segre Pisos 1, 2, y 3  
**Caracas 1071**  
Tel: (58-2) 239-4244  
Fax: (58-2) 238-4008  
(58-2) 239-3080

**Zambia**

Handled by HiPerformance,  
South Africa

**Zimbabwe**

(see South Africa)

**PLEASE SEND DIRECTORY  
CORRECTIONS TO:**

Test & Measurement Catalog,  
54L-AF  
Hewlett-Packard Company  
5301 Stevens Creek Blvd.  
P.O. Box 58059  
Santa Clara, CA 95052-8059  
Tel: (408) 553-7271  
Fax: (408) 983-1006